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## Appendix

# Developing the roadmap for human-machine networks in the sharing economy

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This document is an appendix to the [whitepaper on roadmap for human-machine networks in the sharing economy](#), presenting the background on which the roadmap was developed.

The roadmap has been developed in line with the [HUMANE roadmapping process](#). Specifically, the development process covers:

- **Current technological situation, emerging and future trends:** which sets out the technical context in which the HMN operates;
- **Policy background and regulatory context:** describes the legal background of those HMNs;
- **Key challenges and goals:** the issues which face HMN stakeholders;
- **Suggested strategies and actions:** how to resolve those issues;
- **Overview of the roadmap:** what the resulting roadmap looks like;
- **Timeframe and prioritisation:** when and how the roadmap 'destination' may be reached; and
- **Roadmap dissemination:** how the roadmap is shared with the wider community.

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## 1 HMNs in the sharing economy: Current technological situation, emerging and future trends

Sharing behaviour and collaborative consumption have existed as long as humans have (Belk, 2014). However, with the developments and uptake of the Internet and mobile ICT, the *sharing economy* has emerged as a new way of accessing goods and services. While the sharing economy is still in its early years, the European Commission considers it as implying "a significant potential to contribute to competitiveness and growth" (European Commission, 2016, p. 2). It is predicted that the value of sharing economy transactions in Europe will increase substantially the coming years, from 8 billion Euro in 2015 to an estimated 570 billion Euro in 2025 (PwC, 2016).

Key to the sharing economy are (a) models that facilitate access to goods and services, rather than ownership, and (b) the reliance on the Internet as a means of connecting the owners and users of these goods and services (Belk, 2014). Belk (2014) defines collaborative consumption as "people coordinating the acquisition and distribution of a resource for a fee or other compensation". Others, such as Botsman and Rogers have a broader understanding of what is included in the sharing economy, such as giving away surplus goods or services (Botsman & Rogers, 2010).

The term sharing economy refers to a broad set of services and practices, and is understood analysed in slightly diverging ways. Botsman and Rogers (2010) distinguish three main areas of collaborative consumption, including *collaborative lifestyles*, leveraging sharing of non-tangible assets such as skills and competencies, *product-service systems*, concerning the sharing of tangible assets such as consumer goods, and *redistribution markets*, addressing peer-to-peer distribution of used goods.

In their report on the sharing economy, PwC (Lieberman, 2015) discuss four sharing economy areas: automotive and transportation, retail and consumer goods, hospitality and dining, and media and entertainment. In a more recent study, PwC (2016) has adapted these areas to include sharing of competency and work capacity, which is in line with e.g. Malhotra and Van Alstyne (2014).

Currently, the landscape of sharing economy services is constituted by a (a) small number of large, transnational service providers such as AirBnB and Uber, (b) a modest number of established providers that dominate particular countries or regions, and (c) an extensive set of start-up service providers that aim to take markets shares from the established service providers and target new markets.

The sharing economy is by some seen as representing a fundamentally new approach to service provision, where the service platforms do not need to hold a large inventory, but rather serve as matchmaking middlemen connecting existing supply with demand (Sundararajan, 2013).

Theorists have explored how business models as well as consumer attitudes and behaviour change as a consequence of the emerging sharing economy. For example, Cannon and Summers discuss sharing economy and regulation (Cannon & Summers, 2013). Belk (2014) discuss business implications of the sharing economy. Malhotra and Van Alstyne (2014) discuss how sharing economy services should create consumer value. However, the underlying interplay between technology and consumers, and how to design for supporting this interplay, has not been given the same attention. In particular, we do not have sufficient knowledge on how the design of sharing economy platforms and services

affect user experience or behaviour, the services' capacity for innovation and improvement, and issues such as privacy and trust.

This gap in the literature is critical, as it is difficult for policymakers and service developers to respond adequately to future developments in the sharing economy without sufficient insight into how sharing economy services, as well as their underlying technological and societal context, should be shaped in order to exploit their industrial and societal potential.

As a first step towards closing this gap, we will in this section present an analysis of human-machine networks in the sharing economy. By *human-machine networks*, we mean assemblies of users and networked technology in which synergistic effects are made possible; as they are in sharing economy networks. The analysis will, in particular, address the human-machine networks of the sharing economy in terms of the involved actors, their relations, as well as the extent and the organization of the networks. The analysis will in turn serve as basis for developing a roadmap for human-machine networks in the sharing economy.

The analysis is based on 19 interviews; nine with representatives of sharing economy services, referred to below as *service owners*, six researchers who study the sharing economy, referred to as *experts*, and four policymaker representatives within the public sector and NGOs, referred to as *policymaker representatives*. In addition to these interviews, we draw on the current academic and practitioner literature. The involved service owners, represented companies of four key sharing economy areas: hospitality, transportation, consumer goods, and sharing of work capacity. All interviews were conducted with Norwegian participants. Hence the findings will reflect the Norwegian context. This may limit the wider applicability of the findings. At the same time, the orientation towards the Norwegian context is useful as this is a context characterized by a relatively small and homogenous market which makes it easy to get an overview of the current landscape. Furthermore, as Norway has a comparatively high penetration of mobile Internet, a key enabler of sharing economy services, findings from this country are likely also indicative for the near future situation in countries with lower current mobile Internet penetration.

In the analysis, we will consider current challenges in designing well-functioning human-machine networks for collaborative consumption. We will describe stakeholders' goals for sharing economy services, the gaps that need to be closed to attain these, as well as the potential means to close these gaps. This forms the basis for a roadmap for future human-machine networks for the sharing economy. In this document we present the analysis serving as the basis for the roadmap. The roadmap itself is presented in a separate whitepaper.

The intended audience for the roadmap is sharing economy platform developers and owners, as well as policy makers oriented towards technology and societal issues.

## 2 Policy background and regulatory context

As a basis for our presentation of stakeholders' perceptions of challenges, goals and potential means to reach the goals for human-machine networks in the sharing economy, in this section we provide background on the policy and regulatory context of sharing economy HMNs.

### **Policies and regulations for the sharing economy?**

In the aftermath of the recent financial crisis in Europe, European policy has to a large extent focused on innovation and economic growth. The Europe 2020 strategy for smart, sustainable and inclusive growth is the main driver of the Union towards creating more jobs and better lives<sup>1</sup>. Meanwhile, the uprising sharing economy introducing new business models driven by an increased demand for sustainable consumption was eagerly embraced by European and national policymakers in order to achieve the goals of smart and sustainable growth.

However, as is often the case, policy making has not kept pace with technological developments. This has left the sharing economy in a regulatory grey zone in terms of market access requirements, data protection regulation, taxation, and consumer or employee rights. These issues are acknowledged on European level and was addressed in the European Agenda for the collaborative economy<sup>2</sup>.

Sharing economy services have been seen as a challenge to current regulation and policy. Koopman et al. (Koopman, Mitchell, & Thierer, 2015) argue that current regulations and policies may not serve consumers' best interest. In particular, current regulations may provide an undesirable disadvantage to sharing economy innovators as opposed to established services providers.

### **Policymaker expectations for the future development**

Among the interviewed experts and policymakers, three expectations about the future development for HMNs in the sharing economy were prevalent.

#### **a) Convergence of sharing economy and traditional service provision**

On the one hand side, there is a convergence of the sharing economy and "regular" eCommerce services in the on-demand, or platform driven economy. This is exemplified by Uber, which operates in the grey zone between a ride sharing service (which would belong to the sharing economy) and a commercial on-demand transportation service.

#### **b) Awareness of sharing economy services among traditional service providers**

Furthermore, among the established commercial players, we observe a growing awareness of the competition they are facing from services in the sharing economy, exemplified by the recent €64m take-over of the British start-up *Onefinestay* by the global hotel chain Accor<sup>3</sup>, or the acquisition of the ride sharing services *Hailo* and *MyTaxi* by the car manufacturer Daimler Benz<sup>4</sup>.

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<sup>1</sup> European Commission (2010) Europe 2020 - A European strategy for smart, sustainable and inclusive growth. Available at: <http://ec.europa.eu/eu2020/pdf/COMPLET%20EN%20BARROSO%20%20%20007%20-%20Europe%202020%20-%20EN%20version.pdf>

<sup>2</sup> European Commission (2016). A European agenda for the collaborative economy. Available at: <http://ec.europa.eu/DocsRoom/documents/16881>

<sup>3</sup> <https://www.bloomberg.com/news/articles/2016-04-05/accor-buys-onefinestay-to-grow-in-luxury-serviced-homes-market>

<sup>4</sup> <https://techcrunch.com/2016/07/26/confirmed-hailo-sells-60-of-company-to-daimler-as-it-merges-with-mytaxi/>

### c) Consolidation within certain areas

Another expectation is that we will observe a consolidation of certain areas of the sharing economy, where domains like mobility or accommodation will be dominated by few large players. This development might be reinforced by the complex regulation landscape imposing compliance challenges that can be hard to overcome by start-ups.

Traditionally, such consolidation can either lead to closed, exclusive ecosystems, where the main players use their power to introduce high market entry barriers for newcomers, or open platforms that again allow for a growth market of add-on services, such as Lotel, a start-up that provides advertising, cleaning and insurance services for users that rent out rooms or apartments through AirBnB<sup>5</sup>.

A goal for decision makers should be to avoid creating additional barriers for start-ups, as such emerging new players are likely to be valuable for the development of the sharing economy as a viable market area. A way to reduce barriers may be, for example, to make it easy to comply with regulation.

### A transfer from human agency to intelligent digital platforms

Human-machine networks in the sharing economy need to be seen in the wider context of *on-demand* (or *access*) *economy* (digital, primarily mobile, marketplaces that offer convenient access to goods and services) and the platform economy that allow for a plethora of services and business models to connect to and build upon). While the former contributes to reducing friction in business models and transactions, e.g. replacing the *man-in-the-middle* by pervasive and ubiquitous digital platforms, the latter opens up for efficient implementation, testing and roll-out of new businesses. As such, these concepts are highly technology-driven, building upon the ever growing market penetration of smartphones and other connected devices as well as social networks.

In the context of HMNs in the sharing economy, this means that we observe a transfer of human agency to digital platforms. While finding a person to borrow a reliable car from could be a tedious task, involving inquiries to friends, relatives and friends of friends, this time-consuming activity has been obsoleted by mobile services such as Zipcar (<http://zipcar.com>) or the Norwegian Nabobil (<http://nabobil.no>) matching supply and demand at the users' fingertips. Or, to put it another way, while the traditional view on digitalisation entails the transformation of analogue processes into digital ones, the access and platform economy introduces well-known processes from the digital world into peoples' physical, day-to-day lives.

The frictionless access to a new and desirable set of resources, enabled by technology, is key to human-machine networks. At the same time, the rise of the sharing economy is not purely technology-driven. (Botsman & Rogers, 2010) argue that the experiential aspects of a growing awareness for sustainability among consumers has paved the way and accelerated the uptake of collaborative consumption. Yet others, such as (Hamari et al., 2016) point also to the experiential aspects of sharing economy services.

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<sup>5</sup> [www.lotel.no](http://www.lotel.no)

### **Utilizing sharing economy platforms as basis for regulatory compliance**

Interestingly, while the regulatory aspects of sharing economy services have been much debated (Cannon & Summers, 2013; Koopman et al., 2015), less attention have been given to how the digital platforms of the sharing economy may, in principle, provide improved support for regulatory compliance.

Within some of the more mature sharing economy platforms, rich data on financial transactions are registered and stored within a single framework. Potentially, this could be exploited by policymakers and regulatory bodies. However, this does not seem to have been a key point in the debate on regulation.

## **3 Key challenges and goals**

Through the interviews with service owners, researchers and policy maker representatives, a number of challenges and goals for HMNs in the sharing economy were identified. The interviews were structured according to the HUMANE typology and method (Følstad et al., 2017). Specifically, the interviews addressed the four analytical layers of the typology; the actors, relations, network extent and network structure of the sharing economy HMNs.

In this section, we present the identified challenges and goals for each of these four analytical layers and underlying dimensions. This way, we are able to address challenges and goals of relevance for multiple aspects or perspectives on HMNs in sharing economy. Given the complexity and emerging character of the sharing economy field, not all challenges and goals may apply equally well to all sharing economy HMNs. Nevertheless, we find the identified challenges and goals to have a sufficiently broad relevance to be a useful starting point for the HUMANE roadmapping activity.

### **3.1 The actors of sharing economy HMNs – challenges and goals**

The sharing economy is characterized by collaborative consumption between non-professional users, facilitated by specific sharing economy services. The services typically are embodied as platforms for sharing and collaboration; platforms that are constituted by online facilities for matching people and supporting transactions.

Main actors of the sharing economy, hence, are non-professional consumers on the one hand, and service owners represented through technology platforms on the other. We discuss challenges and goals concerning each of these below, in terms of human agency and machine agency.

#### **Human agency – empower consumers**

Through sharing economy services, consumers are empowered to access a new range of goods and services, offering the potential for bargains, new experiences, and more sustainable consumption. Consumers are also empowered as potential providers of goods and services, that is, to contribute to the supply-side of consumption.

This empowerment of consumers entails a range of challenges and goals for sharing economy HMNs. In particular, our participants reported on the following:

**Motivate consumers:** While sharing economy HMNs represents vast opportunities for empowering consumers, not all consumers are equally eager to participate. In a Norwegian survey on peer-to-peer online second-hand markets, conducted by two HUMANE researchers in the project Conserve & Consume (Lüders & Følstad, 2015), it was found that while about half the Norwegian population have sold or bought items on such markets the last year, only about 15% are heavy users. Hence, a key challenge for sharing economy HMNs is to motivate users to join in - both at the supply and demand side.

Previous research (Hamari et al., 2016) has pointed out a number of motivational factors for consumers in sharing economy services. In particular, financial gains, experiential aspects, and a perceived sustainability benefit. Hamari et al. suggest that the potential financial gains are the most important, while the perceived sustainability benefit is relevant mostly for consumers that already hold positive attitudes for collaborative consumption. Möhlmann (2015), in a survey study of users of sharing economy services for transportation and hospitality found, that the users' likelihood of returning to the services is explained mainly by self-benefit. Perceptions of environmental impact were found to have no impact.

In line with Hamari et al. (2016) and Möhlmann (2015), most of the participating service owners argue that the financial and practical aspect of sharing economy services are important to users. Sharing economy HMNs need to be financially alluring or convenient to reach high market uptake. At the same time, both the experiential and sustainability aspects are accentuated by all service owners. In particular, most of the service owners seem to place more weight on sustainability as a key selling point than what the findings of Hamari et al. and Möhlmann suggest.

**Change consumer behaviour:** Hand-in-hand with the goal of motivating users, is the goal of changing consumer behaviour. Sharing economy services implies a fundamental shift in consumer behaviour, moving from buying new to buying second-hand, moving to individual ownership to shared ownership. Changing behaviour is difficult as it concerns the discontinuity of habit. Discussing sustainable consumption, Verplanken & Roy (2015) suggest that the habit discontinuation is more likely in contexts of contextually dependent discontinuities. For example, for commuters it is more likely to establish a habit of car-sharing in a period of strike in collective transportation services. Without such "naturally" occurring discontinuities, behavioural change is less likely.

The services owners typically reported it challenging to change consumer habits, particularly because consumers need to change their views on service acquisition. One of the service owners suggested that millennials may represent a tipping point for sharing economy services, which is in line with Verplanken and Roy's argument that consumers in contexts of discontinuity, as youth and young adults are exposed to, are more likely to take on new habits.

Among the policymaker representatives, there was little if any attention towards the challenge of behavioural change. Rather, these were concerned with policy-making targeting the formalization of sharing economy services rather than exploring policies leading more directly to change in consumer behaviour.

**Provide quality control:** Malhotra and Van Alstyne (2014) point out low quality as a potential challenge in sharing economy services. For example, low quality content in ad listings. Similarly, a

lack in quality control may make it challenging for consumers to know what to expect as the demand side in a sharing economy relationship, in terms of the quality of shared or used goods, or the timeliness and standardization of the service.

While the service owners involved in our study all noted the importance to leave the users in control of some aspects of the sharing or reselling processes, they all see the need of streamlining the process to reduce frictions between suppliers and consumers. The platform and the encounters with other consumers need to be seen as convenient and frictionless, while at the same time the platforms should allow the transaction to remain its characteristic as a process between two non-professional users. That is, the HMN needs to reduce friction while keeping a human face. The need for providing convenient and frictionless services in the sharing economy was also addressed by most of the researchers. The researchers, however, to a somewhat greater extent than the service owners accentuated the value of leaving users of sharing economy in control, that is, to allow for relative high levels of human agency. Finding the right balance between the need for standardisation, to strengthen quality control, and the need to allow users flexibility and freedom to shape the services they way they want.

**Leverage role diversity:** Users take on different roles in sharing economy HMNs. For example, while it is common to have tried selling or buying through online second-hand markets, only a few use these a lot and the frequent sellers may not be frequent buyers and vice versa (Lüders & Følstad, 2015).

This role diversity in sharing economy HMNs is acknowledged by service owners, researchers, and policymaker representatives. Some of the service owners note that, in particular, on the supply side there may be high levels of specialization where suppliers in e.g. online second-hand markets or transportation take on volumes resembling professionals.

Some of the service owners also noted that role diversity may be driven by life-situation factors. For example, young adults may be more likely to serve as demand side in consumer goods services, whereas older people may be more likely to be on the supply side. This role diversity is argued to be potentially beneficial, as it may help balance supply and demand. At the same time, it indicates the importance of engaging a broad range of users in HMNs to fit all the roles needed.

### **Machine agency – predictions and match-making**

In HMNs for the sharing economy, technology platforms are taking the role as the man in the middle, providing intelligent and personalized matching of supply and demand. This match-making character of sharing economy services is so characteristic to the degree that the US Department of Commerce has defined sharing economy services as digital matchmaking firms.<sup>6</sup>

**Strengthen prediction capabilities:** Key to the success of sharing economy HMNs is the predictive ability of the platform. While the Internet and mobile ICT have been seen as initial key enablers of the sharing economy (Belk, 2014), the developments in artificial intelligence and machine learning

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<sup>6</sup> Telles, R. (2016). Digital Matching Firms: A New Definition in the “Sharing economy” Space. ESA Issue Brief. U.S. Department of Commerce. Available online: <http://www.esa.gov/sites/default/files/digital-matching-firms-new-definition-sharing-economy-space.pdf>

may be just as important for its future development. This, however, is not unique to the sharing economy. As the involved researchers and policymaker representatives noted, artificial intelligence and machine learning will likely be transformational for almost any sector.

The participating service owners, researchers and policymaker representatives all report on the importance of advanced prediction capabilities for a successful sharing economy service. The mentioned areas where predictions are important include matching supply and demand, suggesting alternative goods or services, supporting fair pricing, and identifying illicit behaviour such as fraud.

The participants argue that good prediction capabilities are important to reduce noise and increase conversions. Furthermore, they argue that good prediction capabilities may strengthen trust in the platform, as well as between the participating individuals.

**Platforms that allow predictions:** The participating service owners explained how the technology platforms of sharing economy services are key to gathering the data needed to build prediction capabilities. For platforms where both the matching of supply and demand, as well as the subsequent transaction, is supported, a wealth of data may be obtained – in turn leading to improved predictions. Given a sufficiently large volume of data, and detailed knowledge of transactions, it is possible to measure effects in detail and use these for prediction making.

At the same time, as noted by some of the participating service owners, the benefit of large volumes of data highlight a potential challenge for newcomers, as the established actors will have an advantage in data quality and quantity. One of the participants discussed that to be able to make valid predictions, large data volumes are needed. This may make it challenging to start-ups. In fact, the importance of predictive analytics was pointed out by another one of the service owners who had established a business model on selling specialised analytics services to other reselling platforms inside and outside of the sharing economy, thus filling a thereto undiscovered blank spot in the ecosystem.

Hence, most of the service owners reported that the technology supporting the sharing platform was equally as important as the marketplace. That is, the two are in a symbiotic relations where the marketplace depends on the technology platform for matchmaking, whereas the technology platform depends on the marketplace for data.

### 3.2 The relations of sharing economy HMNs – challenges and goals

Following the analysis of the actors of the HMN, we study the relations between them. In particular, we consider the relations between human actors, in the form of *social ties*, and the relations between human and the technology platform, in the form of *human-to-machine interaction strength*. Both of these dimensions support insight into challenges and goals of sharing economy HMNs.

#### Social ties – the good meeting of strangers

**Keep the human aspect:** Peers are key to sharing economy HMNs. In the literature, it is noted how consumers' use of sharing economy services may be linked to feelings of social relatedness and intrinsic motivation, which in turn may be a source to enjoyment (Hamari et al., 2016).

For most of the service owners, the social meeting between people is reported to be an important part of the service experience. As one of the participants expressed it: “*users come for the price and stay for the experience*”. Hence, service owners reported as an important goal to facilitate meetings between humans, so as to keep the human aspect. Some of the service owners also accentuate the importance of human encounters in order to establish trust and reduce undesirable incidents.

However, the importance of the human aspect in sharing economy services may vary between service contexts. This was suggested by both service owners, researchers, and policy makers. There may be individual differences in the degree to which users want or desire social interaction as part of the service experience, where may also be differences depending on the context (e.g. business-oriented vs. leisure-oriented), and also between sharing economy market niches.

***Matching strangers rather than group formation:*** While most of service owners accentuate the importance of keeping the human aspect of sharing economy services, they do not report to be particularly concerned about facilitating strong social ties between users. Some of the service owners have set up follower functions, but have not made it a main priority to use these for establishing closer personal links, subgroups or communities within the service. The reasons for this, as reported by most of the service owners, is that such group formation is not seen as critical for the value of the platform as a sharing economy facilitator. For the service owners it is more important that the users tie to the platform rather than that they tie to a particular subgroup of users within the platform.

Hence, the service owners reported as a main priority to strengthen the loyalty between the users and the platforms, rather than encouraging strong ties between individual users. That users gather in groups is seen as something that may happen, but not something that is particularly encouraged. However, one of the service owners take a different viewpoint of this and see group formation and leveraging existing social groups as desirable.

The concern for loyalty also entail cross-platform issues. Some of the service owners argue that users may benefit from using different channels or interfaces for different purposes. For example, to provide all details needed as a supplier, a desktop interface may be preferable, whereas for rapid browsing of potential matches a mobile application may be preferable. Hence, loyalty needs to be established across channels, that is, loyalty needs to be established for the brand rather than for a specific online environment.

#### **Human-to-machine interaction strength – develop loyalty to the platform**

The participating service owners argue that the main relations in sharing economy HMNs will be between users and the digital platforms, rather than between users. Though services and transactions are conducted between users, the main tie should be to the platform. For the platform to take on this role, it will be critical for the platform to develop trusting relations with its users.

***Develop trusting relations:*** Trust has thoroughly been discussed as critical for sharing economy services. (Botsman, 2016) discusses three layers of trust: Trust in the idea of collaborative consumption, trust in the platform, and trust in the individual. Trust in the individual may be affected by the design of the platform, such as the opportunity to provide personal photos (Ert, Fleischer, & Magen, 2016). At the same time, trust-increasing features such as personal presentations and review systems may be manipulated or biased; users may manipulate their own reputation by biased

positive reviews or descriptions, or users may manipulate others reputation by biased negative reviews (Malhotra & Van Alstyne, 2014).

The development of trusting relations is also seen as closely associated with how sharing economy services handle risk. Hence, risks associated with sharing economy services has been a much debated issue. In particular for transportation services such as Uber (Malhotra & Van Alstyne, 2014).

Most of the service owners report that establishing a trusting relation with their users is an important goal. Following the reasoning of Botsman, they work with trust aspects of the meeting between the consumer and the service platform and trust aspects pertaining to the encounters between individuals using the platform. Likewise, some of the researchers and policy maker representatives accentuate the need to establish such trust.

Some of the service owners report on the importance of personal interaction and encounters between individuals as important to create trust. Others discuss the importance of social recommendation systems, and the necessity to have some level of policing of the user activity on the site; for example to detect fraud. Also, the researchers and policymaker representatives see social recommendations within the sharing economy services for establishing and keeping trust to the platform and, in turn, between the users.

The service owners, as well as some of the researchers and policy maker representatives also accentuate that risk management is critical to successful sharing economy services. For example through the establishment of good insurance options, so that the sharing economy service can help users manage risk in sharing transactions.

Some of the service owners also accentuated the challenge of fraud, in particular as geographical reach is increased. Hence, platform owners need to police the network to curb unethical or illegal behaviour.

### **3.3 The extent of sharing economy HMNs – challenges and goals**

Human-machine networks may differ widely in size and geographical reach, which in turn has important implications for how the networks are perceived and used, as well as how they evolve. In this section, we consider the goals for sharing economy HMNs pertaining to the extent of the networks.

#### **Network size – the need for large scale**

All being startups, the sharing economy services involved in the study are typically relatively small compared to the most well-known services such as Uber and AirBnB. Nevertheless, all participating service owners report on a strategy for growth. From a service owner perspective, each individual transaction in the sharing economy platform is of relatively small value. Hence, they see the need for the platforms to facilitate large volumes of transactions to be economically sustainable, something that indicate the need for large-scale networks. Several of the service owners reported on ambitions to become national leaders in their field, and several had international aims.

Network size is also discussed by most of the service owners as important for the HMN to have the potential to provide good matches to a specific supply or need. Furthermore, a large number of

transactions are needed to make valid matching or predictions. Newcomers to the market will be challenged in terms of poorer matchmaking ability, both with regard to actual suppliers and seekers, and in terms of prediction capabilities based on artificial intelligence and machine learning.

The need for large size, to support a sustainable business and to meet matchmaking demands, is suggested by the researchers and policy-makers to indicate a potential winner-takes all market where there is only room for one or a few actors within a sharing economy market area. Potentially, newcomers in a few years from now will be even more challenged than current service providers. Some argued for the need to make sure that policies and regulation on sharing economy services helps alleviate this tendency, so as to make it possible for innovative newcomer services to be established.

### **Geographical reach – keep local relevance while scaling**

**Local relevance in trans-local service provision:** All service owners report ambitions of becoming large-scale services; indicating the need to provide services of a broad geographical reach. At the same time, the service owners acknowledge the highly local character of many sharing economy services. For example, sharing of work and competency may in many cases require physical proximity, similar to the sharing of transportation or goods. Furthermore, sensitivity to the local context may be important to best adapt the service. And a local orientation may strengthen trust and reduce the risk for fraud. Also some of the researchers addressed the need for local relevance, in the sense that sharing economy services need to be developed with a sensitivity to the local context.

**Services that scale:** At the same time, some of the service owners report on the need to develop their platforms and services to scale across local contexts. That is, platforms and services need to be developed in a way that they can be implemented in different local contexts with a minimum of contextual tailoring. This is seen as important both to be easily recognized for users that use the service across local contexts, and to be able to scale up the service at a low cost. The HMN must, hence, facilitate the establishment of local ecosystems for sharing while supporting a trans-local presence.

Balancing the need for adapting to local context with an ability to efficiently scale across local contexts is assumed to be critical for sharing economy services.

## **3.4 The structure of sharing economy HMNs – challenges and goals**

In the HUMANE typology, the structure of HMNs is considered in terms of *workflow interdependence*, that is, the dependencies between the actions of the actors in the network, and *network organization*, that is, the degree of hierarchical or centralized organization in the network. These dimensions are seen as having particular impact on the network capability for change in response to contextual developments.

### **Workflow interdependence – support efficient interaction**

The workflow interdependence in sharing economy services concerns the interaction between the actors involved in a given transaction. Typically this will be a supplier, a customer, and the platform. An efficient transaction thus depends on the responsiveness and accuracy of the service provision. This, clearly, does not always happen. There may be issues both in response times, in clarity, and in

keeping deals and agreements. We can call this a dialogue challenge. Also, the need to match supply and demand in a market with a broad variety in offerings and less predictability than traditional commercial markets, may imply planning challenges.

**The dialogue challenge:** Most of the service owners report that they see it as beneficial to allow users a certain flexibility in their interaction with others. At the same time, the service owners acknowledge that this flexibility may introduce friction in the interaction and report on a need to further reduce such friction. For example, users may need guidance on reaching agreements fast to avoid too many messages back and forth, and there may be a need for sanctioning mechanisms for users that do not adhere to accepted agreements.

However, since much of the interaction takes place not with the service owner but with another individual user, the service owners explain that it may be difficult for the service owners to get insight into all the details concerning the customer experience. Hence, it may be difficult to monitor and manage the quality in the dialogue and interaction. Also, as argued by several of the service owners, the interaction between the users may not benefit by being fully streamlined as this flexibility serves to maintain a level of human touch in the service provision.

Also the interviewed researchers discussed the dialogue challenge for sharing economy services. Here, this challenge was seen as closely tied to the possible need to standardise or streamline services. That is, to mitigate the dialogue challenge by way of reducing human agency. At the same time, the researchers did not see reducing human agency as a straight-forward solution, as for many contexts they also considered high levels of human agency to be valuable to the service users.

**Reduce the need for planning:** Due to the broad variation in offerings in sharing economy services, some of the service owners report that using sharing economy services may require some more planning by the individual consumer than using regular commercial services. For example, whereas a traveller typically may book a room at his favourite hotel at short notice, he may need to plan more in advance to book a particular apartment through a sharing economy platform. This need for planning may represent a threshold that is difficult to surpass for some potential users. Reducing the need for planning is seen as potentially beneficial, as reported by some of the service owners. Strengthening the supply side of the sharing economy HMNs is reported as a possible way to reduce the need for planning, as users in demand of goods or services would then have greater chances of finding a match at short notice. Also, planning needs may be reduced also by strengthening the prediction capabilities in the sharing economy platforms. Hence, this challenge is closely tied also to the question of increased machine agency in the networks.

### **Organization – predictable services**

Network organization concerns its degree of hierarchical or centralized structure, which in turn hold implications for the network's capacity for dynamic adaptation and change. This capacity may be limited in networks characterized as highly hierarchical or centralized, whereas a larger degree of self-organization may entail strengthening of this capacity.

**The platform as the central node:** As the growth of the sharing economy is enabled by the technological developments of the Internet, it may be tempting to assume that sharing economy services have substantial self-organization. However, the participating service owners rather argued

for a centralized structure as beneficial. In particular, the platform is seen as the central node through which the interaction between users are conducted. Between service owners, differences exist in terms of how much of the interaction between users is actually conducted through the platform. Some, for example, do not provide means for financial transactions or transportation of resold goods. Others, support all transactions of the service process through the platform.

Some service owners also discuss whether the self-organizing ability of the network may change as matchmaking increasingly will rely on artificial intelligence. Here, matches between users will be determined by the platform and the user together, rather than by the user alone. Improved prediction abilities in the platform, may reduce the users' need to have an active role in the matchmaking.

The service owners also report that the need to ensure a certain level of quality, the need to remove friction in interaction between users, and the need to balance supply and demand also point towards a more centralized mode of service provision. For the latter, the service owners typically reported on a need to encourage an increase in the supply side of the sharing economy networks.

**Service delivery networks:** Within the field of service research, it is noted an emerging trend of services being provided in networks of interrelated service providers, so called service delivery networks (Tax, McCutcheon, & Wilkinson, 2013). Within the sharing economy, such sharing economy networks are commonplace. For example, redistribution platforms may depend on third party services for payment and transportation, in addition to utilizing social media channels to promote both the service and second-hand goods sold there.

Some of the service owners, as well as the researchers and policy maker representatives, reflected on such service delivery networks in the context of the sharing economy. Third party services which were discussed included insurance companies for risk management in the context of rentals, marketing services for promoting content on sharing economy platforms, transportation services for transfer of goods bought through online redistribution platforms, payment services such as solutions for mobile payment, or platform-providers for startup sharing economy services.

An important challenge in such service delivery networks may be that the individual user may need to serve as a service integrator, tying together the services needed for completing a sharing economy transaction. This may be seen as beneficial, as it allows for greater flexibility, but it may also be seen as complex and confusing as the users are exposed to a range of providers which they may or may not be familiar with. Some of the sharing service owners accentuate the benefit of flexibility, also as it reduces the responsibility for the sharing economy platform. For example, if the users of the platform needs to figure out themselves how to transfer money for the shared goods this reduces the burden on the platform. At the same time, it may increase the workload on the users. Hence, other service owners argue for the possible need to integrate such service delivery networks within the sharing platform so that the sharing economy platform and not the user is the service integrator.

### 3.5 Societal aspects of sharing economy services -challenges and goals

In addition to the challenges and goals identified for the HUMANE analytical layers and dimensions, the participating service owners, researchers and policy maker representatives pointed out a number

of challenges, goals, or topics of interest of relevance to sharing economy services. In this subsection we report on four of these

### **Strengthen consumer awareness of sharing economy services**

The participating service owners report that in spite of the current interest the sharing economy and its most well-known services, such as AirBnB and Uber, still experience an awareness challenge. That is, their potential users are not sufficiently aware neither of them as specific services and of their niche within the sharing economy.

The service owners typically want their brand to immediately come to mind whenever potential users experience a particular need, as for example transportation or specific types of goods, and aim to increase the engagement of users and build a loyal relationship. They acknowledge the hard competition that has appeared within many of the sharing economy service areas, but argue that currently the main competitors are not other sharing economy companies but rather the established traditional service providers. Increased competition between sharing economy companies is argued even to be beneficial as it serves to increase attention for sharing economy services at large.

### **Policy and regulations**

As the sharing economy matures, there will be an increasing need for adapting policies and regulations to facilitate the development of innovative and sustainable services. At the same time, policies and regulations are needed to ensure that the evolving sharing economy is in line with societal expectations concerning, for example, taxation, workplace standards, and consumer rights. The European Commission (2016) accentuates the need to avoid a regulatory context where there is uncertainty regarding the rights and obligations of those participating in the sharing economy.

Service owners, researchers and policymaker representatives pointed to the need for policies and regulations that motivated to sustainable and transparent services. While policy making and regulation was often discussed from the perspective of the need not to hamper growth in sharing economy services, some also pointed to the current opportunity for government policy makers to positively guide or direct sharing economy services owners and users. In particular, some pointed out the current opportunity for government policy makers for requesting transparency in sharing economy platform, potentially strengthening adherence e.g. to tax regulation. Others pointed out the opportunity to motivate consumers to increase their use of sharing economy services, for example by providing financial incentives for sharing of resources such as cars.

### **Blurring boundaries**

The researchers and policymaker representatives, more so than the service owners, discussed and challenged the boundaries of the sharing economy. For example, by pointing out the lack of a commonly taken up definition of sharing economy and that sharing is a form of social behaviour that has existed as long as mankind. Furthermore, the range of services categorized as within the sharing economy makes it challenging to identify a set of strict common criteria for these services.

The blurring of boundaries between sharing economy companies and traditional services and goods providers was mentioned as interesting by some of the policy maker representatives and researchers. Here, it was discussed how traditional providers take up practices which also

characterize the sharing economy, such as for example social recommendation systems or by expanding on sharing-like offerings such as leasing.

### Managing unintended implications – keeping a green perspective

Some of the service owners, as well as the participating researchers and policy makers, discussed how to deal with unintended implications of the sharing economy in general, as well as within particular sharing economy platforms. The main example of such discussions was how to deal with potential implications that may affect the green character of the sharing economy.

Nearly all the service owners reported on ecological sustainability as being an important motivation for the service, though they did not expect it to be important for all their users. Some also argued for the need to have financial owners also seeing environmental sustainability as important.

However, concern was voiced by several of the participants that sharing economy services may well deviate from this green starting point. In particular, in cases where demand in the sharing platform outstrips supply and the low prices and easy access provided by the platform increases demand. Here, sharing economy services could actually drive increased production rather than merely utilizing surplus capacity.

## 4 Suggested strategies and actions

The participating service owners, researchers and policymaker representatives discussed a number of possible actions and design strategies to mitigate the identified challenges and goals. In this section, we provide an overview of the potential actions that are discussed, as well as the challenges and goals for which no immediate actions or strategies were identified.

The overview is summarized in Table 1, where we list the identified challenges and goals and present actions and strategies discussed by the participants. The different possible actions and strategies are reviewed in more detail below the table.

Layer	Area of interest	Challenges and goals	Possible actions and strategies
Actors	1. Human agency: Guiding consumers	Motivation and behaviour change: Motivate consumers and drive behaviour change	Accentuate financial gains and convenience Leverage circumstantial causes for habit discontinuity Explore existing niches of collaborative consumption
		Standardisation: Provide quality control and leverage role diversity	Standardised processes Invest in customer culture and provide differentiated products
	2. Machine agency: Match and predict	AI-driven predictions: Strengthen prediction abilities through intelligent platforms	Prioritize prediction capabilities Access to large volume user data
Relations	3. Social tie strength: The	Experiential aspects: Keep the human aspect	Human meeting value adding Social interaction as a feature

Layer	Area of interest	Challenges and goals	Possible actions and strategies
	good meeting of strangers	Brief social encounters: Matching strangers rather than group formation	Matching strangers default approach for sharing economy services – also in the future
	4. Human-machine relationship strength: Loyalty to the platform	Trust in the platform: Develop trusting relations	The platform as the basis for trust Mechanisms to strengthen trust in the platform
Network extent	5. Network size: Increase network size	Growth and consolidation: Increase network size	Prepare for consolidation and winner-takes-all markets
	6. Geographical reach: Local relevance in trans-local services	Local and global: Local relevance in trans-local services. Services that scale	Address the local-global challenge
Network structure	7. Workflow interdependence: Efficient interactions	Efficient dialogue and reduce the need for planning	Standardised processes (see "Actors" above) Invest in customer culture and provide differentiated products (see "Actors" above)
	8. Network organization: Predictable services	Centralised organisation: Strengthen the platform as a central node	Develop the relation to the platform as the main relation
		Service provider networks	Sharing economy services as resource integrators
Societal aspects		Strengthen awareness	First mover curse or first mover advantage?
		Policy and regulations	Allow innovation and growth in the evolving sharing economy Direction through policy
		Blurring boundaries	Uptake and adaptation of sharing economy practices
		Managing unintended effects	Identify and counter unintended implications

**Table 1: Overview of potential actions and strategies for sharing economy HMN**

In the following, we provide more detail on the suggested actions and strategies. Where relevant, we also point out related design considerations identified through previous work in HUMANE (Følstad et al., 2016, 2017).

## 4.1 Actors: Key actions and strategies

From the analysis of human and machine actors in sharing economy HMN, three main challenges and goals have emerged as particularly relevant. In the following we discuss actions and strategies of relevance for these.

### Motivation and behaviour change

**Accentuate financial gains and convenience:** As indicated in the literature (Hamari et al., 2016; Möhlmann, 2015), the promise of ecological sustainability may not be sufficient in itself to motivate consumers to use sharing economy services. Rather, these authors highlight the need to accentuate financial gains and convenience, as well as experiential aspects.

The interviewed service owners are clear on the need to provide value propositions that accentuate the financial aspects of sharing economy services. This position is also reverberated by some of the researchers and policy maker representatives. For example, that the services enable you as a supplier to make money on surplus resources in a convenient manner. Also, experiential motivations, in the meeting between private persons as part of the sharing transaction or in the finding of "treasures" when buying used goods through online redistribution platforms, and also sustainability motivations, such as the desire to avoid waste, are argued as important motivators. However, financial gains and convenience are more important still.

In consequence, sharing economy services will need to accentuate potential financial gains and convenience as part of the provided service. Policy makers, likewise, may potentially support such motivation of users through financial incentives for using sharing economy services.

**Leverage circumstantial causes for habit discontinuity:** Changing consumer patterns of behaviour is hard. The service owners all agree on this challenge, and some indicate that life situation may determine whether consumers are willing and able to make the needed change. Also, the participating researchers and policy maker representatives acknowledge this challenge.

Some of the service owners argued that changing life-events for consumers may represent a golden opportunity for behaviour change. As examples of such circumstantial causes they list life-events (when moving, when becoming a student, when getting a family). Potentially, service owners could to a larger degree leverage circumstantial causes. For example by addressing users in changing life circumstances, or in non-everyday situations such as vacations. This strategy for behaviour change is in alignment with research on habit discontinuity presented by Verplanken and Roy (2015).

Hence, targeting groups that are in a life situation where habit discontinuity is likely, may be particularly relevant to achieve the needed behaviour change. For example, targeting a younger demographic may be one way to exploit changing life situations for habit discontinuity.

**Explore existing niches of collaborative consumption:** Some of the service owners and researchers also pointed out existing niches of collaborative consumption as a potential means to drive a broader uptake of sharing economy services through behaviour change. In such niches, collaborative consumption is already the norm and does not require a fundamental change in behaviour. For example, among farmers sharing of harvesting resources and equipment has been a norm for centuries. Within more recent communities, such as photographers and movie producers, sharing

and peer-to-peer renting of specialized equipment is common practice also prior to the sharing economy.

Potentially, such niches of collaborative consumption may be used to drive behaviour change also for other market areas. In particular for services or platforms which provide a wide range of sharing options. Such niche sharing may also serve to strengthen general public awareness of sharing economy services.

### **Standardisation**

**Standardised processes:** Most of the service owners, and also some of the interviewed researchers and policy maker representatives, argued for the need increasingly streamline or standardise the sharing processes conducted within their platforms. While acknowledging the need to be flexible and allow for as much agency in their users as possible, most of the involved service owners acknowledged that a lack of process support where the users are free to figure out how to do the sharing themselves may be counterproductive.

Standardising processes typically implies making the sharing economy services more closely resembling the processes of eCommerce services, with detailed support for all phases of the transaction. However, typically depending on two-sided markets where the users represent both the supply and demand side, sharing economy services typically may not achieve the same level of standardisation and quality control as may be expected in a regular eCommerce transaction.

**Invest in customer culture:** One response to the non-feasibility of entirely standardising typical sharing economy processes, some of the service owners discuss means of investing in customer culture and helping users to become better sharers. Providing guidance materials was suggested as one approach to this.

Investing in customer culture may also entail individual support to users as a way to strengthen quality in presentations and services. This may be resource demanding, but is seen as a long-term investment in increased quality. In the literature, it is also discussed how investment in customers may provide such an effect.

Malhotra and Van Alstyne (2014) argue that sharing economy platforms will benefit from investing in their users so that these are able to create more value as for example AirBnB has done by investing in helping their supply side with improved quality in the prospects pictures and descriptions.

**Provide differentiated products:** Sharing economy platforms include different types of consumers holding different roles. Some lean towards being suppliers, others represent demand. Some want efficient and highly streamlined processes, others are more appreciative of the experiential aspects of the services.

Currently, most sharing economy platforms arguably provide the same value offering to all its users. Indeed, individual configuration is often possible, but the way the sharing transactions are conducted often are expected to be similar for all users.

Some of the service owners discussed the possibility to provide different types of products to accommodate different types of users. Such product differentiation is already seen in leading providers, such as the different Uber services (e.g. X, SUV, BLACK), or AirBnB regular booking and the book now option.

The option of providing differentiated products may represent a means of balancing the need for standardisation and the need for allowing for as much agency in the human users as practically feasible. In the future, it will likely be important for sharing economy service providers to provide more clear differentiation between different service options.

**Relevant HUMANE design considerations:** To build a positive customer culture, as discussed above, some of the design considerations previously identified in the HUMANE project may be relevant:

- **Support improvement through showing trends and good examples**<sup>7</sup>: On how to users may be led to improve their communication through being shown successful examples from others.
- **Protect new users from bouncing**<sup>8</sup>: On how a human-machine network may encourage experienced users to take responsibility for and support newcomers.

### AI-driven predictions

**Prioritize prediction capabilities:** Most of the service owners accentuated prediction capabilities as a competitive advantage for sharing economy services, and a need for prioritizing the strengthening of such capabilities in the sharing economy platforms. Prediction capabilities are critical for enabling good matching between users with goods or services available and users in need for such services, simplifying the process of entering ads or Examples of how such prediction capabilities can be utilized are, for example, seen in recent applications for redistribution markets, such as American LetGo<sup>9</sup> or Norwegian Snapsale<sup>10</sup> where ease and convenience is strengthened through, e.g. automatic image recognition so that sellers get automatic support in categorising and writing their ads, and prediction capabilities to provide relevant suggestions to potential buyers.

Some of the service owners also noted other areas where strengthened prediction capabilities may be critical such as in fraud detection, in adapting the service to the changing context of the users, and in providing lifecycle services for products or services targeting users on the basis of their prior consumption patterns.

Some of the service owners, as well as the researchers and policy maker representatives, however noted that prediction capabilities need to be designed and implemented with care. In particular, it was argued to be important that the prediction capabilities were perceived as helpful and beneficial by the users. Hence, a user-centred design of prediction capabilities, where these are designed and validated mindful of users' needs and how they are perceived by users, is important. In particular, it was advised that users should be given the opportunity to override automatic suggestions when needed. In part, such overriding of automatic suggestions may be handled by introducing differentiated products, as discussed above, with varying levels of automatic prediction and matchmaking.

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<sup>7</sup> <https://networkprofiler.humane2020.eu/patterns/8BcHkWuL3rWktmNkZ>

<sup>8</sup> <https://networkprofiler.humane2020.eu/patterns/CYjHiYMuuvYjdwrFN>

<sup>9</sup> LetGo - <https://letgo.com>

<sup>10</sup> Snapsale - <http://www.snapsale.com/>

**Access to large volume user data:** When discussing prediction capabilities, some of the service owners made particular note of that prediction capabilities in the sharing economy platforms require access to large volumes of user data. This includes data on user profiles, but also data on transactions and their outcomes to enable prediction of successful matching and recommendations. For sharing economy services, access to large volumes of data may be critical, something that may favour large, established service providers. Hence, for start-up companies access to user data may need to be resolved through other means. Possibly, through links to third party service providers, such as providers of social media services, though this was not specifically mentioned by any of the service providers.

At the same time, the need for large volumes of user data will require sharing economy platforms to be particularly mindful of privacy and data protection regulations. Hence, while strengthening their access to user data, and improving prediction capabilities, sharing economy services will benefit from prioritizing to establish and maintain comprehensive quality processes for data management.

## 4.2 Relations: Key actions and strategies

From the analysis of the human-human, as well as the human-machine relations in sharing economy HMN, three main challenges and goals have emerged as particularly relevant. In the following we discuss actions and strategies of relevance for these.

### Trust in the platform

Trust is accentuated as a key issue in sharing economy services, by service owners, researchers and policy maker representatives alike. In particular, they see it as necessary to strengthen the relationship between the users and the sharing economy service. In the terminology of HUMANE, they see the need to strengthen human-machine relationship strength. As pointed out by some of the participants, sharing behaviour has always depended on trust. However, in pre-Internet times, sharing behaviour has been dependent on trust between individuals or smaller social groups. In the sharing economy, trust do not primarily depend on the relations between individuals but on the relation between the individual and the sharing economy platform.

Hence, building trust in the platform is seen as critical. As actions and strategies towards this goals, the service owners, as well as the researchers and policy maker representatives, pointed out a number of possible actions to strengthen trust in sharing economy platforms. Specifically, a number of mechanisms for strengthening trust was discussed, many of which are applied in current sharing economy services:

- **Build trust through social recommendation:** Most participants discussed social recommendation and rating as a critical means of building trust in the platform. In particular as the platform mainly aim to match strangers. Sharing economy services typically have such recommendation systems available, but their design and implementation differ. Providing effective and efficient social recommendation may represent a competitive advantage in terms of trust building.
- **Reduce risk through insurance:** Provision of insurance as part of the service may be instrumental in building trust and reducing the risk associated with sharing practices. In

particular for market niches where current insurances may not cover liability sufficiently during sharing, such as for car sharing. One consequence of this is that third party insurance providers may hence see sharing and collaborative consumption as a new market area. Provision of effective and efficient sharing economy insurance may represent a strategic advantage both for sharing economy service providers and insurance providers.

- **Trust through traceability in transactions:** Some of the policy maker representatives discussed the traceability in transactions provided by sharing economy services as a potential trust enhancing mechanism. This was exemplified with the traceability provided by Uber, contrasted with the traceability in a regular taxi. As such, the traceability in transactions may represent safety-enhancing surveillance.
- **Thrust through privacy policies.** While traceability in transactions represent a strengthening of trust through surveillance, some of the researchers and policy makers also accentuated the need to build trust through beneficial and easy to understand privacy policies. Balancing the potential for traceability in sharing economy services with privacy requirements may be critical for building trust in sharing economy platforms.

The success of sharing economy services is seen as depending on the degree to which the platforms are trusted by the users to provide adequate recommendations and matches, and the degree to which they help users to reduce risk. To build trust in the platforms, emerging sharing economy service may in the future be prepared to take responsibility for more of the risk associated with sharing than what may be the case for some of these today.

### **Brief social encounters**

When discussing social tie strength in the context of sharing economy services, nearly all service owners accentuated that the default mode of operation, also in the foreseeable future, was to match strangers rather than build closely knit subgroups. Indeed, some of the services include social functions such as following, and nearly all include social recommendations. Nevertheless the service owners typically reported not to see any incentive to strengthen social ties between their users. Some also noted that strong social ties may work counter to effective social recommendation systems, as friends may be prone to assess each other less critically than would strangers.

Given that social encounters are to be kept brief in the sharing economy services, it may be strategically relevant to identify other means of building community than through social ties. Some of the researchers discussed how user commonalities could be exploited for building a sense of community in a human-machine network of strangers. Examples of such commonalities are social demographics, such as age, gender and geographical location. Also, common interests may strengthen commonality in the HMN.

A strategically important action for sharing economy services may, hence, be to identify how commonalities in user groups may be applied to guild a sense of community in a HMNs where the default mode of matching is the brief social encounter between strangers.

### **Experiential aspects**

While the service owners saw the default mode of operation for sharing economy services to be the matching of strangers, nearly all also accentuated the experiential value of the positive meeting

between strangers in the context of the sharing economy. This meeting between humans was reported to be value adding, and something that increase loyalty in the service. Furthermore, the meeting between humans was reported to potentially reduce risk as this was seen as strengthening the involved users' sensitivity towards each others' needs and inducing borrowers to be more careful with the borrowed goods.

Hence, for sharing economy services it may be important to facilitate such beneficial meetings. In consequence, some redesigns of a sharing economy service to improve efficiency, such as the pick-up of keys for shared cars in third party locations, should only be implemented with sensitivity to the potential cost in terms of reduced personal meetings between those involved in the sharing transaction.

However, as reported by some of the service owners, researchers, and policy maker representatives, not all users desire the meeting with strangers as part of a sharing economy transaction. This may be due to individual differences between users, differences in context, and differences between market niches. Hence, some of the service owners suggested the positive meeting between strangers to be designed as an opt-in/opt-out feature, where the users may choose between a sharing mode with or without a personal meeting with the other user involved in the sharing transaction.

### **4.3 Network extent: Key actions and strategies**

From the analysis of the extent of the sharing economy HMNs, in terms of network size and geographical reach, two key challenges and goals emerged as relevant. In the following we discuss actions and strategies for these.

#### **Growth and consolidation**

Sharing economy services typically strive for international reach and massive market shares. In the interviews, nearly all the stakeholders reported on intentions of massive growth and increased geographical reach. Likewise, the researchers and policy maker representatives made note of this trend and reflected on the implications of such growth.

As may be self-evident, such ambitions for growth imply that much of the start-up sharing economy services of today will not be able to stay competitive over time. Indeed, the sharing economy market is projected to have exponential growth the coming years (PwC, 2016), but the market likely still will not be sufficiently large for all current services to prevail. On the contrary, some of the researchers and policy maker representatives predicted substantial consolidation within sharing economy services, potentially towards a winner-takes-all market for each sharing economy market area such as hospitality, transportation, and consumer goods.

For sharing economy services providers, it will be critical to consider how to stay competitive in a market characterized by few, large players. For example, by targeting particular niche markets, or by working towards market leadership in limited geographical regions.

For policy makers, it may be important to consider how the active use of policy and regulation could mitigate a situation where a single actor becomes too powerful in a given market, to keep up competitiveness.

### **Local and global**

While service owners typically accentuate the need to extend global reach for their particular service, they also highlight the importance of local relevance. In the service owner interviews, the potential tension between local relevance and trans-local (or possibly global) reach was thoroughly discussed. Local relevance was seen as important both in terms of building trust and loyalty, in terms of becoming a market leader in a given geography, and in terms of sharing typically being locally embedded.

Service owners hence need to work strategically towards leadership in any local region in which they aim to develop. For this purpose, as discussed by some of the service owners, local adaptations may be tempting, and given that the local region is sufficiently large, may also be a feasible option. For example may a sharing economy service to some extent be efficiently adapted to a national or regional context. At the same time, the local adaptation should not be allowed to become so extensive so as to hamper extending geographical reach.

In the future, most sharing economy services will depend on growth, which in turn will imply scaling across geographies – possibly on an international level. Successful services will be those who are able to balance the strategic aim for local relevance with the strategic aim for ease of scaling across local contexts.

## **4.4 Network structure: Key actions and strategies**

The final analytical layer in the HUMANE framework is the structure of the network. Here, through considerations of the organization, as well as the workflows in the sharing economy HMN, two key challenges and goals emerged. In the following we discuss actions and strategies of relevance for these

### **The platform as the central node**

While emerging phenomena on the Internet often are characterized by being bottom-up or self-organized, sharing economy service often are characterized by high levels of centralisation. In particular, as single sharing platforms serve as the connecting node for the sharing activity and that only to a limited extent subgroups are formed. This tendency towards establishing the sharing economy platform as the central node in a sharing economy HMNs, was also accentuated by the interviewed service owners. As discussed above, the service owners argue for limiting human agency in the networks to improve quality control, and not to work towards the forming of strong social ties between service users but to strengthen the ties between the individual user and the platform.

This has important strategic implications for sharing economy services. In particular, it will be imperative to serve the users from the platforms and strengthen user loyalty by broadening and improving service offerings. Rather than depending on third party providers independent of the sharing platform to complement the service offering, for example for transportation, payment, insurance, maturing sharing economy services may need to increasingly provide this as part of the service. At the same time, as we shall see below, may it be challenging for newcomer sharing economy services to provide a sufficiently comprehensive service offering.

### **Service delivery networks**

Sharing economy services often has the character of service delivery networks, where multiple providers are involved as part of the users' service processes. For example, by providing options for payment, marketing and communication, transportation of sold goods, insurance and similar.

In the interviews, some of the service owners accentuated the benefit of being only a part of such service delivery networks also as seen from the perspective of the users. For example, some reported to see themselves as a mere matchmaker but that the users would need to figure out some of the practicalities involved in the sharing transaction themselves, such as how to conduct the payment. From the service provider point of view, this was reported to be necessary to make it feasible to start up the service, and also potentially beneficial in terms of making clear to the users that the responsibility of the sharing economy service is limited to the matchmaking.

Other service owners, however, argued that sharing economy services need to mature into providing more comprehensive service offerings, to make sharing processes more predictable and convenient for the users and to serve as a trusted platform. This requires the service platform to be set up as a hub through which a comprehensive set of offerings are provided. These more mature sharing economy platforms will still be part of sharing delivery networks. However, the platform takes on more responsibility as an integrator of the needed service providers.

For sharing economy services to grow into becoming the default option for consumers in a ten year perspective, it seems likely that the services need to follow the example of leading providers such as AirBnB and strive for providing comprehensive service offerings.

## **4.5 Societal aspects: Key actions and strategies**

Through the interviews with the service owners, researchers and policy maker representatives, four goals and challenges concerning societal aspects were identified which do not easily map on the HUMANE framework. In the following, we address actions and strategies of relevance for these.

### **Strengthen awareness**

For the sharing economy to grow as envisioned in the coming 10 period, awareness among consumers is required. Some of the interviewed service owners point out that their current greatest competitors are not other sharing economy services but that consumer still tend to use providers from the traditional service or consumer goods sectors. Also, some of the researchers pointed out this need for strengthening awareness in the market.

Strategically, this may be challenging for sharing economy services. Whereas some areas of the sharing economy, such as redistribution platforms, are well established, other areas are less well known in the general public.

The challenge of strengthening awareness is closely tied to the challenge of motivation and behaviour change discussed above. In addition to strategies for this purpose, it may be beneficial for sharing economy services to collaborate in professional networks for competence sharing and for strengthening visibility.

## Policies and regulations

As the sharing economy matures, policy and regulations need to follow suit. Policy change may be needed to facilitate the establishing of sharing economy services. Also, policies may serve to guide the evolving sharing economy market towards directions that are beneficial for society at large.

Among the interviewed participants, a number of relevant policy areas were discussed. In line with the general EC policy on the sharing economy, the interviewed policy maker representatives see the sharing economy as holding substantial potential for innovation and growth, but that policy change is needed to avoid outdated policies to curb beneficial developments. Relevant areas for policy change to support innovation and growth are transportation and hospitality. We will not go into detail on this, as this has been thoroughly treated in existing policy documents (e.g. EC, 2016).

The participants also discussed policy needs to curb undesirable developments in the sharing economy, as well as policies potentially driving desirable change. Some of these are well known others less treated:

- **Transparency requirements:** As noted by some of the service owners and policy maker representatives, the sharing economy holds great potential for increased transparency in transactions. Something that may be beneficial, e.g., for tax reporting. For this potential to be realized, government policy makers and regulatory bodies may consider to strengthen requirements for reporting from sharing economy platforms. This suggestion is in line with the official Norwegian report on the sharing economy of 2016<sup>11</sup>, where it is recommended that digital sharing economy platforms in the future should be obliged to report on transactions through these platforms.
- **Policies on privacy in the sharing economy.** Because of the value of user data in sharing economy services, as well as the potential benefit of transparency in such services, such services may entail substantial privacy issues. Policies and regulations for privacy will, hence, be of critical importance in such services. Potentially, policy makers and regulatory bodies will need to specifically consider such services in future policy developments. Though not specifically discussed by the participants, sharing economy services may also be in particular need of support for a helpful implementation of the general data protection regulation (GDPR)<sup>12</sup>.
- **Policies to maintain competition in the sharing economy market.** Given that the sharing economy is at risk for evolving into winner-takes-all markets, some participants discussed the need for policies maintaining such competition. This is, however, seen as potentially challenging given the international character of sharing economy services.
- **Policies to encourage sharing behaviour.** Some of the service owners discuss the potential opportunity of government policies to incentivise sharing behaviour. For example, to strengthen the incentives for redistribution of second-hand goods or for co-driving.

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<sup>11</sup> NOU 2017:4. Delingsøkonomien – utfordringer og muligheter

<https://www.regjeringen.no/no/dokumenter/nou-2017-4/id2537495/>

<sup>12</sup> GDPR portal - <http://www.eugdpr.org/>

### Blurring boundaries

As noted by some of the interviewed researchers and policy makers, the sharing economy represent a blurring of boundaries. Both between providers and consumers of goods and services, as well as between traditional service and goods providers and sharing economy providers. For example, it was discussed how useful practices from the sharing economy will likely be taken up by traditional service and goods providers.

In consequence, some of the policy makers and researchers predicted convergence between sharing economy services and traditional providers. Hence, in the future it may be even more challenging than it is today both to define the sharing economy and to specifically design or develop policies for sharing economy services.

### Managing unintended effects

Being a disruptive approach to service provision, the sharing economy is bound to introduce unintended effects. As, for example, when sharing demand outweighs sharing supply, and the platforms for sharing no longer serves to facilitate the sharing of idling resources but rather drives demand for new resources – as is for example seen in the concern voiced for visitor takeover of popular tourist destination due to the efficient sharing of private homes (Slee, 2016).

The service owners, as well as researchers and policy maker representatives, discussed such unintended effects. In particular, the potential drifting away from an ambition of sustainability in services or green consumption due to lowered cost of consumption and a lack in surplus resources or capacity. Some of the service owners accentuated the need to have owners or investors that also has sustainability or green consumption as an explicit priority.

## 5 Overview of the roadmap

In this section, we provide an overview of the sharing economy roadmap, consisting of the implications brought by sharing economy HMNs, the objectives and actions we have set in the roadmap in an effort to address these implications and challenges, and HUMANE design strategies that can assist in the realization of the actions.

Sharing economy HMN implications	Roadmap objectives	Actions to implement the objectives	Related HUMANE design strategies <sup>13</sup>
The actors of sharing economy HMNs: Convenience through	Motivation and behaviour change Strengthen quality control AI-driven	Prioritize financial and convenience motivators Standardize service processes for improved service quality	Behavioural change through social motivation Support improvement through showing trends and good examples

<sup>13</sup> These are presented in more detail in the final HUMANE deliverable on the HMN roadmapping (Jaho et al., 2017)

Sharing economy HMN implications	Roadmap objectives	Actions to implement the objectives	Related HUMANE design strategies <sup>13</sup>
predictions and standardising processes	predictions	Prioritize data capture to support prediction capabilities	
The relations of sharing economy HMNs: Matching strangers through trust in the platform	Trust in the platform Brief social encounters with strangers The experience in the meeting with strangers	Prioritize trust-building mechanisms, such as social recommendations, insurances, authentication systems, transaction traceability, and privacy policies. Provide the social experience as value-adding option (opt in / opt out)	Strengthen trust through rich profiles and recommendations Increasing user trust through transparent algorithms Enhancing security in data aggregation services
The extent of sharing economy HMNs: Growth towards a winner-takes-all market?	Growth and consolidation Local and global	Envision a market characterized by few, large players Work for leadership locally in targeted regions Develop networks that easily scale across local contexts	Consider geography in designing collaboration Apply a loyalty ladder
The structure of sharing economy HMNs: Centralized networks for simplified workflows	The platform as the central node Incorporating service delivery networks	Support entire service process through the platforms. Third party providers as integrated offerings. Strengthen user loyalty by broadening and improving service offerings	Catering for network evolution Managing privacy through trusted third party
Societal implications: Awareness, policies, and change	Strengthen consumer awareness Update policies and regulations	Breadth in actors and services strengthen consumer awareness Consider policies on transparency, privacy, and to facilitate the establishment of sharing economy services.	Design for consumer engagement Campaigns, not routine, for attention in small-scale HMNs

## 6 Timeframe and prioritization

In the interviews with the service owners, researchers and policy maker representatives, the timeframe for how HMNs in the sharing economy may be expected to develop was discussed. For the service providers, we discussed their expected development in a time frame of up to 5 years.

However, given the rapid changes within the sharing economy in part due to a broad range of start-up and newcomer companies, it is difficult to make precise predictions in terms of the timeframe for developments within this field. Also, it is challenging to speculate on how to prioritize the actions and strategies discussed above, as this will depend on a range of uncertain factors.

A more constructive approach to the question of timeframe, may be to take for granted current predictions of growth in the sharing economy, from a 28 billion Euro value of sharing economy transactions in Europe in 2015 to an estimated value of 570 billion Euro in 2025<sup>14</sup>. Such growth require that sharing has been taken up as a default approach to consumption by a substantial share of the European market. For this to happen, the key actions and strategies addressed above will be of high relevance.

A tentative, high-level ordering of when the different actions and strategies may be implemented may be that actions associated with the actors of the sharing economy networks will be highly prioritised. Specifically, actions concerning consumer motivation and behaviour change will need to happen relatively early on for a broad uptake of sharing economy services. According to a Eurobarometer study<sup>15</sup> no more than one fifth of Europeans had used sharing economy services in 2016, and nearly half were unaware of such services. Hence, motivation and behaviour change is key – along with initiatives to strengthen awareness.

Through such motivational and behaviour change, actions and strategies concerning relations between the network actors becomes important. In particular, to establish the sharing economy platforms as a trusted basis for sharing economy transactions.

Actions and strategies pertaining to network extent and network structure may be somewhat slower to address, as these in part depend on actions and strategies concerning actors and relations. Also, societal aspects may be slower to address. This is not to be understood as actions and strategies concerning network extent and structure, as well as those concerning societal aspects are prioritized lower, but that it may take more time to realize these.

An indication of the timeframe for the different actions and strategies is suggested in the roadmap.

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<sup>14</sup> PwC (2016). Shared benefits: How the sharing economy is reshaping business across Europe. <http://www.pwc.co.uk/issues/megatrends/collisions/sharingeconomy/future-of-the-sharing-economy-in-europe-2016.html>

<sup>15</sup> TNS Political & Social (2016). Flash Eurobarometer 438 – the use of collaborative platforms. <http://ec.europa.eu/COMMFrontOffice/publicopinion/index.cfm/Survey/getSurveyDetail/instruments/FLASH/surveyKy/2112>

## 7 Roadmap dissemination

A whitepaper presenting the roadmap on HMNs in the sharing economy has been developed, summarizing key findings and recommendations on the basis of the roadmapping process presented above. This roadmap is intended to serve as a low-threshold overview of key challenges, goals, actions, and strategies of relevance for the development of future sharing economy services.

The roadmap whitepaper is published on the HUMANE project website and promoted through social media channels. Highlights from the roadmap are summarized in an online factsheet promoted through the HUMANE project website. Furthermore, on the basis of the work leading towards the roadmap, a paper presenting the roadmapping work and outcome will be submitted to an academic journal supporting green or gold open access.

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