The Telecommunication Data Cockpit – Full Control for the Household Community

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Abstract. Consumers of telecommunication services become more and more aware and concerned of how their data is treated by providers. Both, the European General Data Protection Regulation and the versatility of new communication-related data use cases drive this challenge. The Data Cockpit Minimum Viable Product is an important step to generate more transparency for private telco customers. It is part of a new 360-degree customer view, which is generated to emphasize the user position in managing telco services and contracts of an entire household. Extensive user research has identified crucial steps to reach use case acceptance, respectively opt-in, by customers as well as key success factors behind building up users' confidence and giving them more control over their data.

Keywords: CRM telecommunication · GDPR compliance · Data transparency · User data · Customer experience · Customer data dashboard · Household view · Permission management · Contract optimization

1 Telecommunication Customer's Need for Transparency

Customers have been consumers for a long time but in the time of new media, their role is changing towards increased interactivity. Given "General Terms and Conditions" are scrutinized. A clear message is expected, rather than long, incomprehensible fine prints.

1.1 GDPR Governance

A spectre is haunting Europe – the spectre of the EU General Data Protection Regulation (GDPR), effective since May 2018 [1]. It has been a great amplifier for data transparency amongst both, the public and the boardrooms. Although, there are not that many changes of the already existing data protection rules, the public awareness increased significantly. End users start thinking deeply about their personal data and

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how companies treat the business-to-consumer (B2C) relationship in practice. Especially, the telecommunication providers are in public focus. Due to the very high potential fines of GDPR, executives also gave more attention to data privacy, in order to control their potential risk exposure. Therefore, GDPR compliance has been seen as an early challenge to be covered by a set of appropriate proactive actions.

Telecommunication providers see themselves as a secured data hub for the digital society. At the Mobile World Congress (MWC) 2019, Deutsche Telekom, Orange and Telefonica issued a white paper under the roof of the GSM Association (GSMA) to prove this position and to transport the key message that data is the fuel for great customer experience and opportunities in the future [2].

1.2 Improvement of the Customer Relationship

The Project Innovation Board of Deutsche Telekom called already early in 2016 for proposals to intensify the dialog with the customer, addressing both, customer data and customer insights. By setting up a project on a 360° Customer Dialogue two main questions were discussed and brought to the following formula:

1. **Trust = Transparency + Benefits**
   How can we get more knowledge about our customers' wishes and reach more opt-ins required to leverage those insights?
2. **Experience = Integration + Relevance**
   How can we integrate customer data across channels to improve customer service and user experience?

While point 2 is treated in the *T-Touch* sub-project, focusing on a cross-channel customer contact history, the contribution of this paper is targeting point 1 by the development of a Minimum Viable Product (MVP) called *Data Cockpit*. The Data Cockpit is a user-friendly interface providing customers with controlled transparency over private data, creating trust and offering attractive benefits in exchange for opt-ins – created in close collaboration with customers.

To generate trust, three protection methods are invented, namely *protection by rules*, *protection by technology*, and *protection by yourself* (user control) [3].

1.3 User Data Categorization

Whenever personal user or user-related data is collected, a clear purpose has to be defined. The storage of data has to be authorized by at least one of the following reasons:

1. **Legal requirements** e.g., person identification for establishing a contract
2. **Business relationship** e.g., service usage metering for billing
3. **Customer permission** e.g., active opt-in for receiving new product offers

Compared to other big new media providers, a high degree of transparency has been identified as a key acceptance enabler in the telecommunication domain. As a proper starting point, the categorization of user data, a telco provider deals with, has been selected.

The most basic data category is personal data. It covers mainly semi-permanent data like name, address, date of birth and a record for proof of legitimation. Further data categories are related to the business relationship of providing and procuring telecommunication services. While the classical business covers fixed and mobile phone usage, by migration towards Voice over IP (VoIP) it moves towards a sub-category of Internet usage. Furthermore, personal TV offers extend the portfolio called Entertain usage. The latest trend covers everything around home control and security, known as Smart Home usage.

Finally, location data is a separate category, which results out of increasing customer mobility and the potential for tracking mobile device locations, which on a technical level is required to register the mobile device at the nearest radio cell and ensure seamless connectivity.

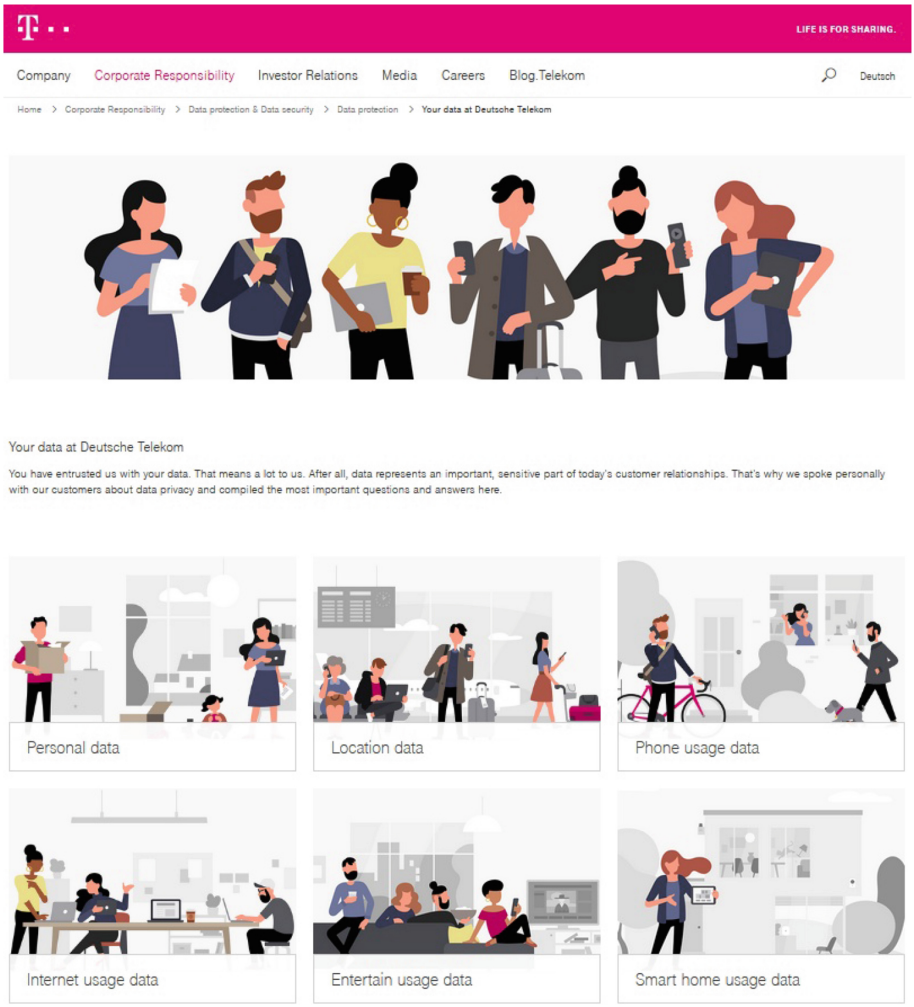


Fig. 1. Information on user data classification at Deutsche Telekom's web pages.

As a first project result, the six identified data categories are described in a more fashionable manner, accompanied by young speech at a dedicated section of the Deutsche Telekom web presentation labelled *Corporate Responsibility* [4], see Fig. 1. To summarize, transparency is achieved as a combination of general information plus individual communication, and personal control, which is an important aspect for the second and third pillars of the Data Cockpit. The message of enhanced data transparency was already transported to visitors at Deutsche Telekom's booth of MWC 2018 [3].

1.4 External Related Work Inspires Internal Research

It is a relatively new possibility for businesses to differentiate themselves from the competition by highlighting data transparency objectives. With an increasing awareness amongst consumers about the value of their data and on the backdrop of numerous data privacy breaches and scandals, data transparency has risen to become a determining factor. A 2016 survey with 2.404 responses found 59% of respondents stating that keeping them informed about data-use policies is an important aspect for them to determine their level of trust for a company. That is just a little less than fair pricing (60%) or quality of products (61%). In addition, 45% would share their personal data if a company asks upfront and clearly states its use [5].

It is not that consumers are unwilling to share their personal data anymore. They just become increasingly educated about it and want to decide for themselves which uses they allow and which one they object. In cases where companies are not transparent enough, such a behaviour quickly generates concern or objection. Across the board, still many companies have not yet gotten the message how important data transparency has become for their customers. Another survey found consumers to be concerned about what businesses do with their personal data - across the board of demographics at a level of about 60%. Covered were 15 countries and 4.368 responses were given [6].

Another survey in eight countries with 8.256 responses shows an even lower degree of trust in companies and institutions. Only 26% of respondents agree that organizations respect the privacy of their personal data, only 20% say they know what happens with their personal data, and only 29% feel in control about it [7]. Since data is also increasingly becoming a key ingredient for targeted marketing activities or even used in products themselves to create better experiences, businesses need to address this general trust issue if they want to benefit from the many use cases that customer data opens for them.

So how go generate trust? It starts with an honest and open communication, of being fully transparent with customers. The top three measures to generate more trust mentioned in our early representative survey with 1.000 interviewees in 256 corporations in Germany [8] are to

- Ensure data is never sold onwards to third parties (73%),
- Clearly communicate the purpose of using data (60%), and
- Provide easy-to-understand and available guidelines about data privacy (54%).

Some of the big tech companies have addressed this issue with customer privacy dashboards, extensive advertising campaigns and related prominently placed

information on their websites. Some of them have also been the ones most prominently involved in data scandals, but still, other industries have not really followed the data transparency trend to the same extent. Even though data plays an increasingly important role in value generation across numerous industries.

Inspired by all these external surveys, a customer survey to emphasize the positive impact of transparency with 1.500 German participants was carried out for the project by our partner IPSOS in 2017. Once trust is established, customers indeed would be open to share their data. Asking for telecommunication use cases, 44% would likely share rich information with their telecommunication provider, while another 47% would share some but not all information. This generates a second requirement after transparency and guidelines: Users need to be able to select, which data they are willing to share for what purpose, and which permissions they want to withhold.

2 Data Cockpit Minimum Viable Product

To cover the overall envisaged approach and guided by the research mentioned above, the entire Data Cockpit project has been divided into separate pillars, which add three more directions to the 360-degree customer view (Fig. 2), aside the T-Touch aspect:

1. **Data Transparency:** General provider positioning on data for clear customer information, refer to Sect. 1.3.
2. **Customer Data Cockpit:** Individual and aggregated dashboard for visualization of ongoing communication service consumption, refer to Sect. 2.3.
3. **Household View:** Interactive mobile app component for benefit and contract management, refer to Sect. 3.2.

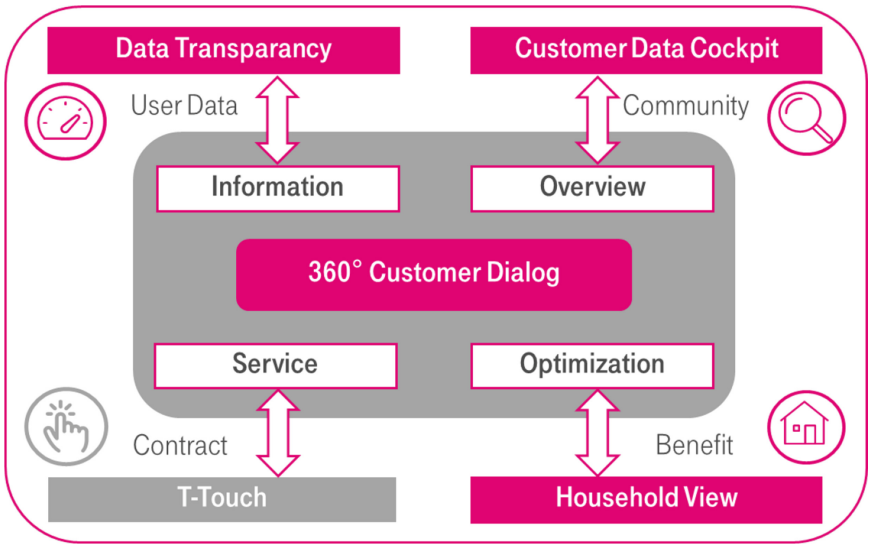


Fig. 2. Pillars and targets of the 360-degree customer dialog.

To support rapid prototyping and evaluate user acceptance, the development result should be an iteratively improved MVP, driven by continuous user feedback loops. Out of the Telekom Innovation Laboratories an adaptive Scrum team was formed, combining enhanced skills in the domains of:

- User-driven design (UX) and innovation,
- Market research and customer interviews,
- Public affairs, legal – especially GDPR – expertise,
- Data models and architectures,
- Software frameworks and operation hosting, and
- Implementation and testing.

Within 31 two-week Sprint cycles, the MVP was designed, implemented, evaluated and transferred to business units by the highly motivated, distributed agile team.

2.1 Research Studies for User Driven Design Methodology

The development of the Data Cockpit has been accompanied by extensive primary research. A large-scale study was conducted to test various Data Cockpit features, especially representative of German population. The "Customer Sprint Club" delivered biweekly customer feedback influencing the development process. The "Innovation Forum" members answered additional quantitative user surveys as online questionnaires. They aimed at testing the latest prototype features and investigated detailed aspects on the respondents' willingness to share data.

From ideation, where potential users were involved in a *Design Thinking* process workshop to end-user interface testing, the whole process was designed around customer needs and expectations. Furthermore, feedback was collected at several conferences [9] and through management and frontline interviews within Deutsche Telekom. Some of the most relevant insights coming out from this research include:

1. **Co-Creation and Ideation Workshops** throughout the project duration helped to gather general customer feedback concerning data privacy and possible acceptance criteria for opt-ins. It also helped to develop and evaluate several concrete use cases. In every aspect, they reemphasized the high importance of transparency and data sovereignty, and showed significant acceptance and usage intention for a proactive approach on personal data like intended with the Data Cockpit.
2. **Customer Sprint Club** designed as qualitative feedback sessions cantered around customers' needs, requirements, insights and ideas. Concept and prototypes were continuously tested in several repeated iterations within the development cycle. This resulted in two very different prototypes for the transparency dashboard that were created in parallel, and prototypes ensured coverage of the whole customer journey and addressing all customer concerns.
3. **A representative validation** of the household management use case as well as the data sharing willingness was conducted by IPSOS in December 2016. The survey concluded that about 75% of the German population like and would use Data Cockpit features, with a high willingness to share personal data in exchange for

using Data Cockpit features. For example, 76% of intended users would share mobile provider data for a feature that gives them a contract and usage overview.

4. **The effect of implemented results** has also been validated besides the concept phase. Regarding the data transparency overview page, a quantitative comparison between the old status quo and the newly implemented information site measured multiple user experience and usability Key Performance Indicators (KPI) in a remote setting. 66% of respondents liked the first impression of the new page, while more specifically significant improvements across all dimensions: comprehension, ease of use, relevance, structure, completeness, and layout have been recorded. This lead to a positive impression on transparency with 74% of survey participants.

As a summary, a broad analysis of existing user research on transparency, own primary research in focus group discussions, and regular Customer Sprint Club consulting during development provided new insights in customer thinking.

2.2 Basic Architecture and Implementation Framework Selection

A robust client-server-architecture has been selected to implement the Data Cockpit MVP. The user client should be a simple web browser, available on all potential customer devices like mobile phone, tablet or laptop. Following user surveys, the MVP followed a *mobile first strategy*. However, the rapid prototyping considered a responsive design, to be adaptive for a wide range of mobile devices using different web browsers.

To reach this aim, two independent components form the server side, named *Household Manager* (frontend) and *Household Controller* (backend). A REST interface for intercommunication allows a flexible distribution of the hardware and software components, see Fig. 3.

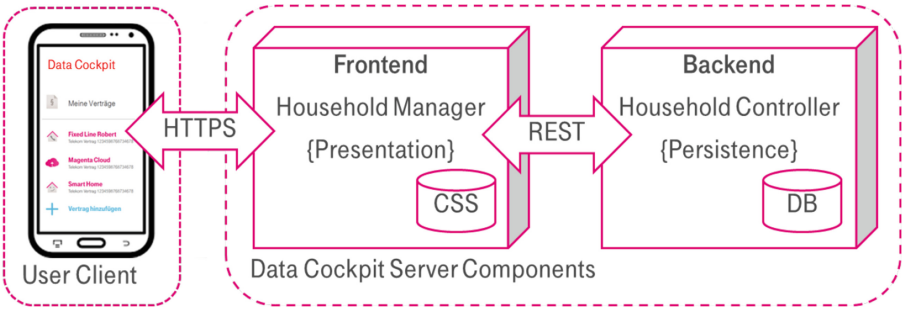


Fig. 3. Client-server-architecture of Data Cockpit MVP.

The architecture is designed to fit with other relevant Telekom apps and customer self-service portals for easy future integration via given Telekom system APIs later on. Clear focus of the MVP is a lean and self-dependent Proof of Concept (PoC) as showcase for necessary alignments.

The project team carefully evaluated different implementation frameworks. To gain creativity in the frontend development for emerging use cases, a key driver was flexibility in graph type selection for data visualization. Node.js® is an open source JavaScript runtime, built on the Chrome V8 JavaScript engine[1]. It operates on a single threaded event based loop to make all executions non-blocking. Developed applications can be easily scaled in horizontal manner by providing additional nodes to the existing system. Rich graphical libraries are available as open source.

Table 1. Development tools for frontend and backend.

	Frontend development tools	Backend development tools
Integrated Development Environment (IDE)	Editor	Eclipse
Programming language	JavaScript, CSS and HTML	Java, Servlets
Source Control Management (SCM)	Git + Tortoise Git, Redmine	Git + Tortoise Git, Redmine
Built tool/documentation	Node.js, NPM	Apache Maven/Swagger
Issue tracker	Atlassian Jira	Atlassian Jira
Knowledge sharing	Atlassian Confluence	Atlassian Confluence

Table 1 summarizes the selection of development tools for the MVP implementation, while Table 2 gives an overview about the operational environments. In-memory databases provide a good performance and can be easily brought back into its initial configuration for comparable user test series.

Table 2. Operational environment for frontend and backend implementation.

	Frontend operation	Backend operation
Runtime environment	Node.js	Java Runtime Environment (JRE)
WebServer/platform	Apache/Tomcat	Apache/Tomcat
Database management	In-memory	In-memory
WebService framework		Spring-Boot
Libraries	SASS, Express, PUG, cujoJS	
Compiler	Node.js	Java
Operating system	Linux 64 bit, MS Windows 64 bit	Linux 64 bit, MS Windows 64 bit

[1] URL: https://nodejs.org/en/.

2.3 GUI Development

By means of partner agencies, two different designs were developed and provided as mock up for user surveys.

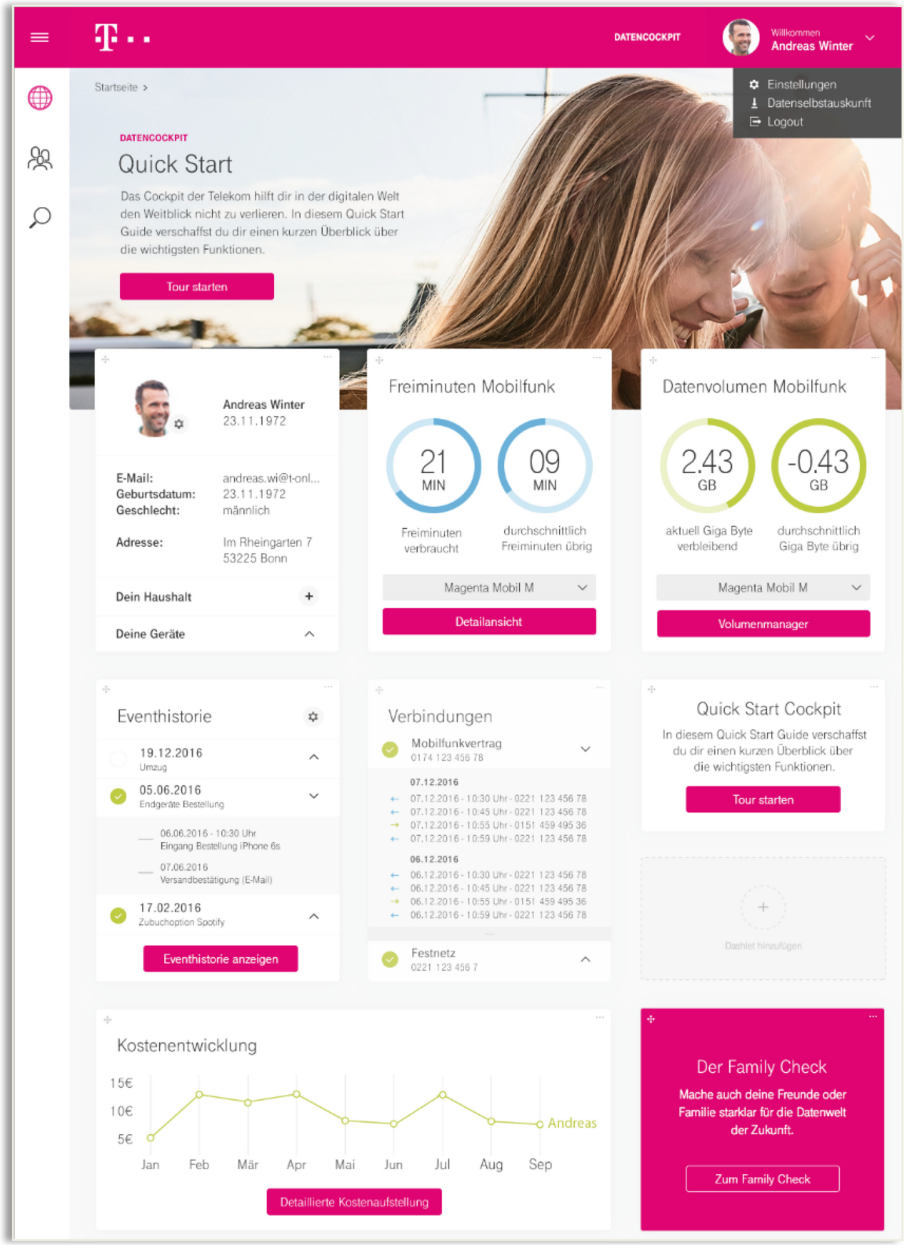


Fig. 4. Full web page design approach for “My Data” in the Data Cockpit.

The prototypes for enhanced personal data display based on user expectations and general market trends. Those were regularly tested with users and challenged in terms of clarity, sequence in the flow and on the page. Consequently, key principles for design were:

- Intuitive design to convey transparency message also with UX design,
- Putting data in the centre, around which functionalities are grouped, and
- Fit with existing Telekom web and mobile app experience

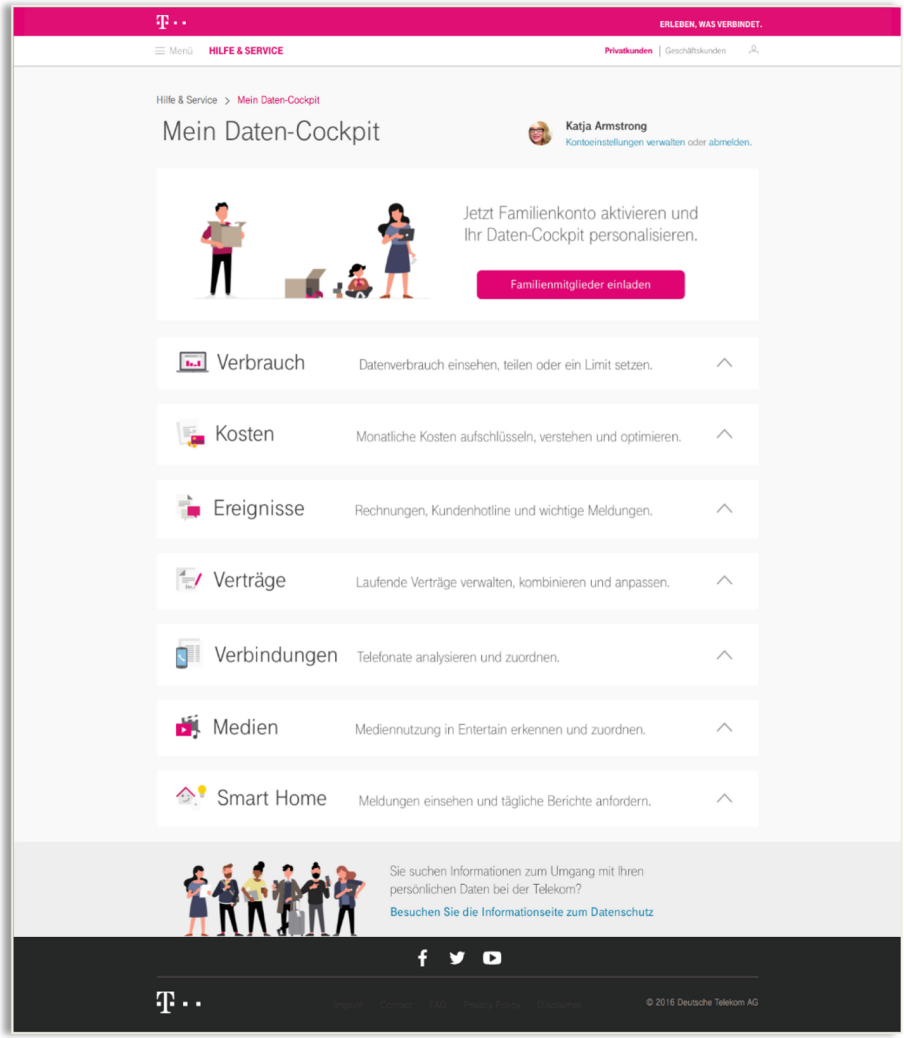


Fig. 5. Single column design approach for “My Data” in the Data Cockpit.

The first approach has a full web page in mind, covering all aspects of user touchpoints, presented in a single screen, as shown in Fig. 4. The second approach was led by mobile consumption, following a single column visualization with extensible sections as depicted in Fig. 5. The applied style follows the one of the data transparency presentation as previously introduced in Fig. 1.

Survey results with 1.500 responses turned out that users have very basic preferences, which can be summarized as need for:

- High intuitivism and simplicity,
- Clear icon and colour speech,
- Logical order and sequence of interaction points, and
- Preferred mobile usage.

3 Community Aspects of Telecommunication Customers

A telecommunication provider's view on customers data comes traditionally from a SIM card view (mobile line unit), has evolved to a contract view (several SIMs) and then customer view (several contracts) slowly with the onset of more holistic Customer Relationship Management (CRM) and customer care services. With the advent of many new services (dual play, triple play, quadruple play) such a combination was more and more necessary, from the customer invoice to handling key customer master data to optimizing the contract bundle as a whole. This already took great effort in consolidating SIM and contract data in the systems to match them to individual customers, especially when coming from previously different business areas like fixed, mobile, internet or TV.

The next step is to view a customer not alone, but in the context of their household (i.e. family). This is the logical level customers themselves apply, when thinking about their contractual obligations, so in most scenarios it makes sense to offer customers to manage all their household contracts together. For telecommunication providers, this information is valuable because up- and cross-sell within a household provide the highest potential – if competitors hold some of the contracts, there is potential for contract changes without cannibalization.

This is why the Data Cockpit takes not only the Telekom contract view, but also includes further external contracts. So for the customer, it is a complete view on all telecommunication services and for Deutsche Telekom it gives the most complete view when considering potential optimization of the contract landscape of a household. Of course, this optimization is only conducted, when the customer approves the respective use of their data.

An additional consideration that complicates this scenario and had to be addressed is the opt-in of other family members for having their contracts managed centrally by one person in the household.

3.1 From Household and Family View Towards a Community Approach

The classical telecommunication business concentrated on access services for fixed line. The Plain Old Telephone System (POTS) got enrichment by digitalization and service integration with the Integrated Services Digital Network (ISDN). In the mid 1990th, Mobile Network Operators (MNO) entered the market. For both, a Fixed Mobile Convergence (FMC) was introduced due to the joint migration based on the Internet Protocol (IP) suite. All-IP networks increase the data overhead but reduce the administrative effort. Therefore, Voice over IP (VoIP) became todays telephone standard.

Looking at the user behaviour over time, contracts belonging to a single person are completed with offers, which address an entire household. The classical communication domain is extended by domains like entertainment and smart home. Complete sets that offer all services to the customer like MagentaEINS dominate the market for households. Products, services, packages and devices are brought together with multiple contracts and a heterogeneous world of identifiers. Figure 6 illustrates this complex view and its dependencies.

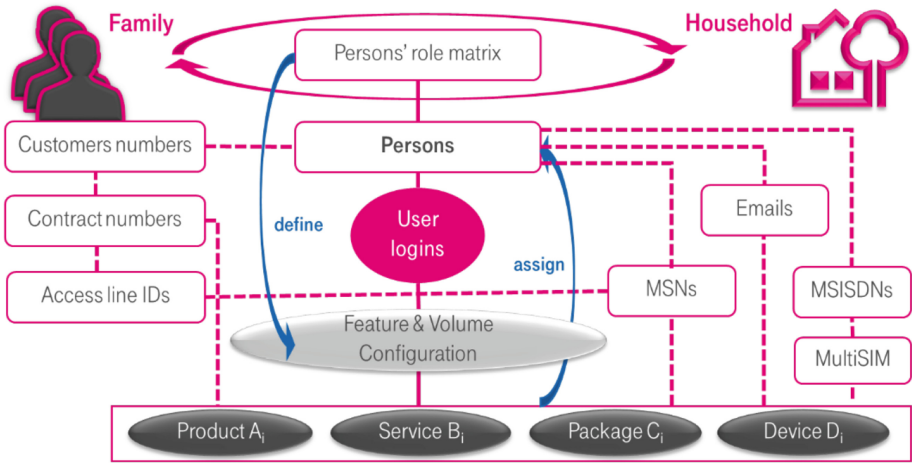


Fig. 6. Object classes for a joint family and household community approach.

In practice, it is difficult to assign specific mobile contracts to a single household. It turned out that typically selected persons of a family are in charge of managing telecommunication and local IT infrastructure. Therefore, a differentiation between household view and family view was introduced.

- A **family** is characterized by one responsible legal person. while service consumption is spread over multiple locations.
- A **household** is characterized by multiple legal persons living at the same physical location.
- A **community** is defined as a manageable conjunction of multiple persons, multiple locations and multiple contracts.

To cover both with a single model, a role management needs to be introduced. The joint family and household view is called the *community* approach.

3.2 Data Model Classes and Functions for the Household View

The implementation relies on object orientation with a community member centric approach. The dependency complexity is modelled as member and contract functions as depicted in Fig. 7. For personal member data, the mandatory set of data is limited to a minimum, following the principle of data sparsity.

The household view (Fig. 8) is designed as add-on part for the Magenta SERVICE App, available for Android and iOS. Following the logical usage, it offers three sections below each other:

- Household member management,
- Contract management, and
- Usage statistics.

For fast user and intuitive interaction, icons guide to the available actions. The user gets the offer to add manually external contracts to gain a complete household cost overview in segments, see Fig. 8. Only Deutsche Telekom contracts can be added automatically after a two-factor authentication.

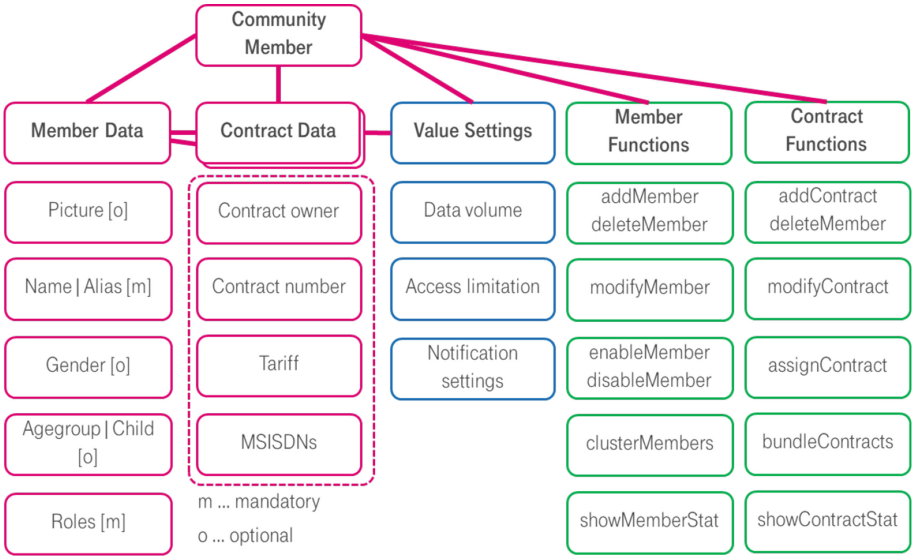


Fig. 7. Initial object-oriented data model for the Data Cockpit.

Step by step, the project owner added additional use cases to the backlog. Accordingly, the data model was extended and new functions were added.

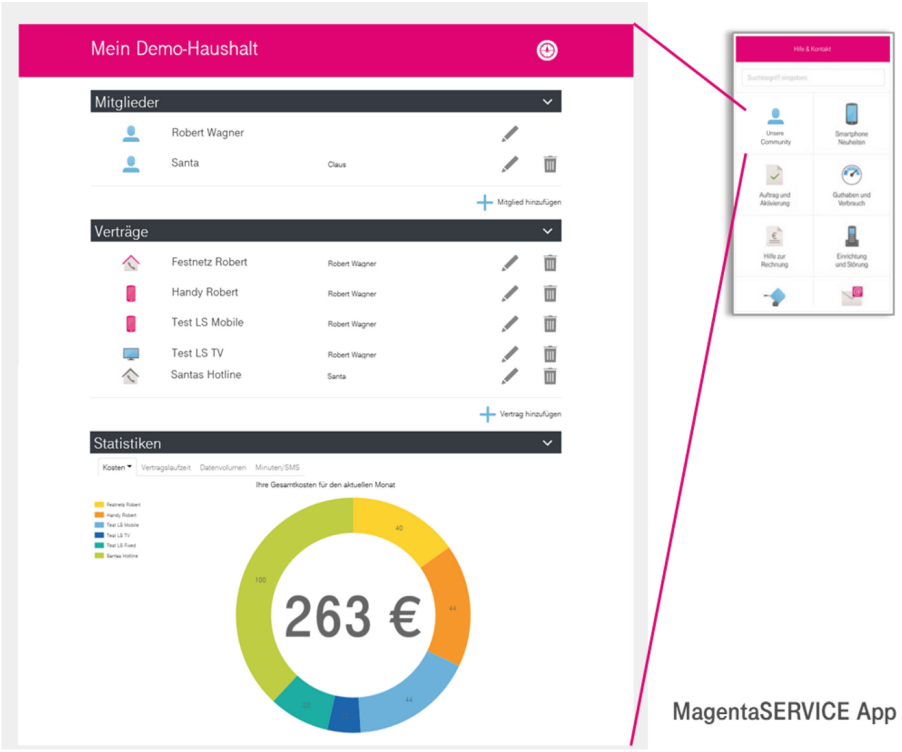


Fig. 8. Mobile screen of "household view" as tile (part) of the MagentaSERVICE App.

4 Data Deal Between Customer and Provider

"Data is the oil of the 21st century" is a citation, which is ascribed to many sources. The big difference compared to natural resources is the data ownership. As soon as personal data is touched, it is rather clear. To get the owner's permission to use it, a win-win setup needs to be created. Telecommunication providers are in a good position, as they are considered to be trusted by many customers. Even more, they are one of the primary candidates acting as data broker in a secure manner, called data hub [2].

4.1 Customer Willingness for Data Provisioning

Looking back, user of a software or service in practise hardly ever read the general terms and conditions, although the installation process or contract signature requires this step. With the given new legal option to deny the use of personal data for non-contractual use [1], many customers at least formally, reject any utilisation. As a logical consequence, two things happened. Firstly, the granularity of any declaration of consent became finer. Secondly, more background information was provided.

It turned out, that customers are generally willing to share their data, but they want clarity over the data that is used as well as the concrete mechanisms and use cases

behind, so there are no "creepy" results coming out. However, customers have different standards e.g., their contract data towards providers such as Deutsche Telekom, where they have high awareness, contrasted with the much more sensitive usage and location data that is collected from their smartphone operating systems or smart speakers more or less constantly, where they have much lower awareness and in consequence object much less. With GDPR, transparency, information and other aspects have become much more a hygiene factor that needs to be in place.

4.2 Favourite Use Cases

Most willingness to share data can be achieved, when concrete benefits relate to those and ideally for use cases, where the type of data and the type of benefit have some clear logical associations.

From several data-benefit pairs, the household view has been selected in customer discussions as the best: give access to the telecommunication contracts of the household in return for a clear and informative contract and usage overview plus potential optimization recommendations.

Customer preferences, evaluated by a user survey, led into the primary use case selection. The family check was selected out of options from Table 3. A high acceptance of customers was recognized for this use case:

- 67% of customers were interested in use case,
- 72% of customers would use household view features, and
- 84% of customers would share personal data in exchange for these features.

Table 3. Use case offers for data sharing between provider and customer.

Use case	Customer opt-in	Customer benefit
Household view	Share household info	Get contract optimization
Hotspot access	Share location	Get special hotspot access
Smart home energy	Share smart home usage data	Get rebates and tips
Entertain experience	Share Entertain view history	Customized recommendation
Paperless & eco-friendly	Share e-mail address	Be environmentally friendly
Movement	Share location	Movement history visualization
Meaningful invoices	Share your contacts	More informative invoices
Cloud storage	Share cloud usage	Get additional cloud storage
Browser history	Share browser history	Get rewards and rebates
E-reader experience	Share e-reader data	Customized CX, relevant content

4.3 Evaluation of the Household Data Use Case

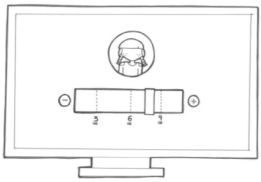
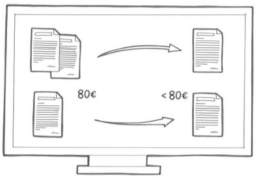
Diving deeper into the household view use case, an online survey within the T-Labs Innovation Forum was conducted with 320 participants end of 2016 in order to evaluate

different telecommunication services and the customers' willingness to share their personal and household data. The tested detailed services within the use case were:

- Overview of current telecommunication contracts,
- Contract management, and
- Tariff optimizer.

Each service was divided into three abstraction levels, see Table 4. Based on a drawing and a description per service and feature each respondent evaluated nine features concerning liking and usage intention.

Table 4. Use case selection for data sharing to be evaluated.

Service A: Overview of current telecommunication contracts	Service B: Contract management	Service C: Tariff optimizer
		
A.1 Overview only for me	B.1 Contract management only for me	C.1 Tariff optimizer only for me
A.2 Overview for my household	B.2 Contract management for my household	C.2 Tariff optimizer for my household
A.3 Provider comprehensive overview	B.3 Transfer of budget and data volume	C.3 Additional product & service suggestions

As a reference, the representative social structure of the evaluation group of the 320 responds looked like that:

- Gender: male – 62%, female – 38%
- Age: 18. . .29 – 14%, 30. . .38 – 23%, 40–49 – 16%, 50. . .59 – 22%, 60+ – 28%
- Household size: single – 28%, 2 p. – 49%, 3. . .4 p. – 19%, 5+ p. – 4%
- Deutsche Telekom customer: fixed – 54%, mobile – 38%, Entertain – 24%

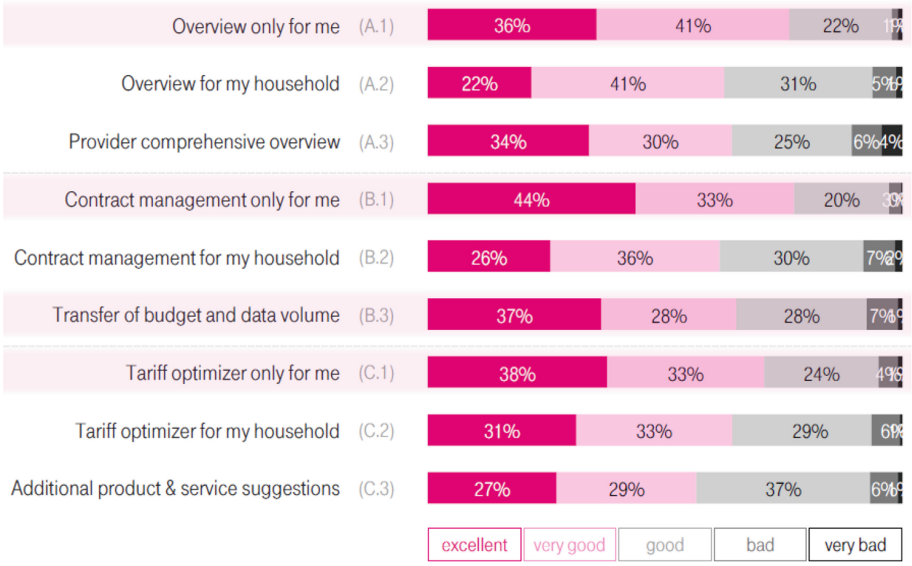


Fig. 9. User survey: spontaneous impression as liking on a five-grade scale.

All three services show a similar high likes, see Fig. 9 and usage intension, see Fig. 10. The three features "only for me" receive a significantly better evaluation than all other features.

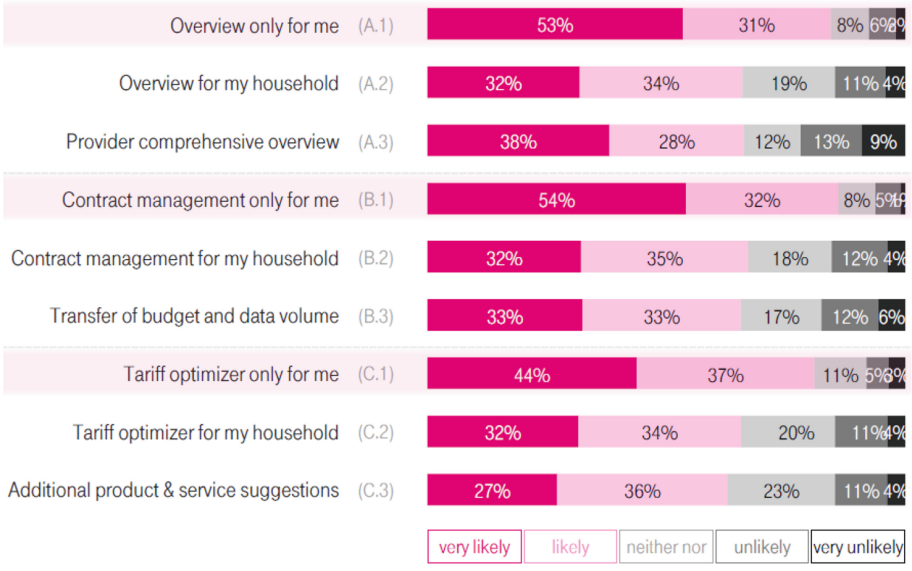


Fig. 10. User survey: feature usage intension on a five-grade scale.

5 Summary and Results

The idea behind Data Cockpit came from the increasingly informed and critical opinion of telecommunication customers towards data privacy, also filled by discussions about recent data leaks, GDPR and respective campaigns by companies enforcing social networks like Google, Facebook or Microsoft.

Initial research has shown that customers are not necessarily unwilling to share data, but they want transparency and sovereignty about the usage of their data and the benefits this also provides for them in return. Thus, the Data Cockpit itself was built around three pillars:

- **Information:** clearly stated and well-illustrated information on the telekom.de/telekom.com sites about different data types, their usage and interesting facts around them; this component went live on all relevant websites and apps.
- **Transparency:** state-of-the-art dashboard design for customers to see their data and have the option to change settings like opt-in; in our PoC, we focused on a draft dashboard design as well as a customer interaction history as part of this dashboard, combining all relevant customer touchpoints/events in an easy-to-understand form.
- **Benefits:** Customers feel comfortable to share their data only, when it makes sense for them and brings benefits. We tested several use cases and for the PoC developed a *household view*, which gives an overview to the customer to all Telekom and external telecommunication contracts and their usage/costs in their family/household, plus the possibility to request offers for optimization.

The household view generates a win-win for both, customer and provider as summarized in Table 5.

Table 5. Household view win-win situation for customer and provider.

	Customer advantages	Provider advantages
Household view	Overview at a single place	Common insights
Contract management	Contract optimization	Targeted advertising
Product improvement	Reminder function	Product shaping learnings
Customer care	Customer self-service	360° view
Legal information	AGB navigator	GDPR compliance
Data maintenance	Adaptively and granularity	Refresh support

As a summary, Deutsche Telekom's Chief Data Office (CDO) identified four milestones to work further on [10]:

1. **Data analytics and enablers:**
   a. Use cases for key business stakeholders,
   b. Personal data self-service-portal by Data Cockpit, and
   c. Establishment of *Halo* program and *Data Intelligence Hub* (DIH) [11].

2. **Data architectures and models:**
   a. Harmonized group-wide *T-Data Model*,
   b. One data lake per National Company (NatCo) strategy, and
   c. Central data virtualization.
3. **Skills and culture:**
   a. DT common use case and asset repository,
   b. Exchange within and across communities, and
   c. Alignment of activities and roadmaps.
4. **Data governance:**
   a. Best practice research and
   b. Data governance with enterprise blueprints.

All phases of the Data Cockpit project have been conducted with focus on the customers and their experience, including various focus group discussions and usability tests. In addition, the use cases are optimized for their business potential together with the Customer Relationship Management department.

The so-called "Customer Acceptance Clause" (Konzerneinwilligungsklausel 4.0) experienced further developments on finer granularity. The MagentaSERVICE App got a new user experience and better feedback channels for the customer in its follow-up version, called *MeinMagenta App* [12], available for free on Android and iOS devices from Google Play Store and Apple App Store, respectively.

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