

# Same, but Different Data - Towards Integrated Food & Household Services

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**Abstract.** While information about our food consumption behavior becomes more and more available through different digitalization trends within this domain, such as food related apps or smart kitchen devices, information remains captured in silos and can therefore not be used for usable and meaningful customer applications. This research in progress presents the approach of integrated food & household services, that are based on best practices of the integrated information systems domain and yet existing integrated fitness & health services, such as GoogleFit or Apple HealthKit.

**Keywords:** food consumption, digital receipt, integrated information systems, human food interaction, household resource management

## 1 Introduction

The ongoing digitalization and distribution of IT-artefacts in the society leads to a change in consumer behavior [1]. With respect to food consumption, this change is visible in the kitchens themselves, where smart kitchen devices and smart speakers are increasingly used. At the same time information about our consumption behavior becomes more and more available through food related smartphone apps, online shopping and tracking of consumer offline buying behavior (e.g. by virtue of loyalty cards like *Payback*), digital receipts and the usage Voice Assistants like Alexa, e.g. to create shopping lists. While, in other domains, integration strategies are a major trend to enable a holistic customer-journey experience [2], the various data sources in the food domain are not integrated so far. Consumers still have to manually transfer the data from one app to another. For example, data gathered by apps for food procurement could not be used by apps for recipe recommendation or diet-tracking. While integrated information systems [3] are well researched in the business domain, the focus on the household is rather a young field [1]. In the consumer market, GoogleFit [4] or Apple HealthKit [5] are efforts to provide domain specific data models and a common interface for the various fitness and health apps. With regard to nutrition, food consumption and household management, so far, there is nothing comparable.

This work is based on a previous interview study where we ask consumers what kind of added value services could be enabled by the *digitalen Kassenzettel* (electronic receipt) in the future [1], [6]. Here, we further elaborate this concept towards integrated Food & Household Services, that pick up the idea of domain specific data models for the consumer area.

## 2 Method

This research-in-progress presents the current state of the analysis and the first concept of the household management system, within the broader context of the design case study approach by Wulf et al. [7]. To specify a reference model for the household and food consumption domain, we analyze the top 100 free apps within the category “Food & Drink” of both iTunes and GooglePlay. The identified features give a first indication of which data and services a domain-specific model should include. We supplement this requirement analysis by studying the literature about the digitalization of food consumption practices and food consumption interaction design [8]–[11].

## 3 Preliminary Results

### 3.1 Existing “Food&Drink” Apps

During the market research we identified 12 sub-categories of “Food & Drink” based on their features written in the self-description, namely Meal Planners (MP), Restaurant Member Apps (RM), Retailer Member Apps (RE), Restaurant Finder (RF), Food

Delivery (FD), Food Sharing / Rescue (FS), Product Information (PI), Storage Manager (SM), Recipe Apps (RA) Cooking Timer (CT), Smart Device Apps (SD) and Diet Tracking (DT).

Table 1 Six-Phase Food Consumption Lifecycle x App-Subcategories

	MP	RM	RE	RF	FD	FS	PI	SM	RA	CT	SD	DT
Procurement	■	■	■	■	■	■	■		■			
Storing								■				
Preparation	■		■						■	■	■	
Eating		■	■				■					■
Disposal								■	■			
Tracking												■

By matching the apps and a six-phase food consumption life cycle covering Procurement, Storing, Preparation, Eating, Disposal, and Tracking [8]–[10], we discovered areas where common data exchange and service interface would reduce multiple programming effort and enable a better integrated user experience across multiple apps.

Most of the analyzed apps focus on one or two phases, and they mainly provide support for the procurement phase and/or preparation phase. Eating and disposal are not yet well-supported, apps only provide information about the best before date or diet related information about the product. But the most important finding is that, all these apps only use integrated data in a limited way. Recipe Apps commonly provide functions to create shopping lists (procurement) based on the chosen recipes (preparation), but the food order (procurement) is neither used for diet-tracking, nor is the electronic receipt (procurement) transferred to storage or recipe recommendations (preparation).

### 3.2 Food & Household Services

The concept of integrated F&H-Services is characterized by an open API usable by app developers, that enables them to create, update and use data according to the different phases of food consumption. Further on, cumulated data can be gathered through the consumption intelligence services that provides budget or nutritional analytics based on consumption history data. These higher services make use of the basic food & household services and data models. These services present the counterpart of the BI-functionality in the ERP world. Furthermore, interfaces to external, 3rd party systems are conceivable, such as food retailers, fitness studios, food sharing platforms or delivery services. The aim is to further develop existing B2B infrastructures in the direction of B2B2C, where shopping and product information can be exchanged automatically. The main advantages of a reference model for F&H-Services are presented below.

**Unusable Gathering of Data.** Our market research leads to the conclusion, that apps e.g. from the SM sub-category need the user to engage in either barcode scanning his

products or listing them by hand. Such approach is time-consuming and a barrier to long-term adoption. Therefore, a reference model would enable transaction data exchange with the IT-services of retailers or restaurants, according to established standards of ERP Systems, see [3]. Further on, gathering of data might benefit of Smart Home Sensors and Devices, as it has already been researched [12] and applied [4], [5] for “Health & Fitness”.

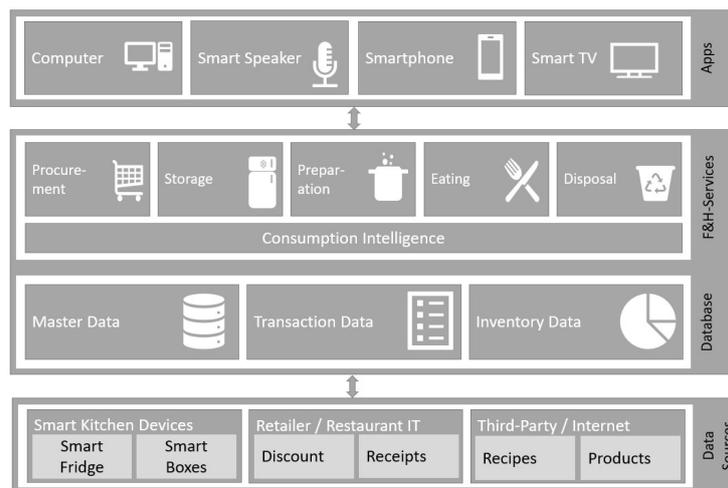


Figure 1 Concept of integrated Food & Household Services

**Isolated Data.** Most of the explored apps do not provide any means to share data with other applications. Some apps allow data sharing with apps of the same developer, but general exchange is neither defined in terms of data formats, nor is it enabled for any broader usage of synergies. The approach presented here aims to define such standards and allows for seamless integration and shared usage of food consumption data, that enables added value services [1], [6]. Such approach is promising as the app-network around GoogleFit [4] shows.

**Missing Product Information.** Similar to the exchange of transaction data, also master data (product information) is exchanged with the F&H-Services. Therefore, the users do not have to rely on user generated product information databases, which often lack up to date information.

#### 4 Future Work

The here presented concept will be further analyzed and used for the creation of a reference model as it is commonly used for ERP Systems. According to the design case study method [7] we have to specify and implement a set of F&H-Services, integrate them in existing apps or research prototypes to evaluate their appropriation within the household.

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