# Experience Categories in Specific Contexts – Creating Positive Experiences in Smart Kitchens

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**Abstract.** Experience Categories are a methodology designed to understand existing and create new positive experiences. They describe aspects of positive experiences within a given context, for example work. The aim of this paper is twofold. First, it is intended as a proof-of-concept – we show that Experience Categories can be applied to new contexts. Second, we describe a design process that focuses on the use of experience categories. Here we explore present positive experiences in kitchens, and how smart kitchens can help us to create and support these. Using Experience Interviews, participants described 94 positive experiences they had around kitchen activities. The analysis yielded 17 Experience Categories for cooking related activities. Based on these categories, we generated concepts to facilitate new positive experiences in the kitchen before, during, and after cooking. We describe this process as well as five concepts including the generation of rituals, trying new things, and supporting each other.

**Keywords:** User Experience, Cooking, Experience Categories

## 1 INTRODUCTION

### 1.1 Positive User Experience

Following Hassenzahl [13, p12] we understand User Experience (UX) as "a momentary, primarily evaluative feeling (good-bad) while interacting with a product or service. [..] Good UX is the consequence of fulfilling the human needs for autonomy, competency, stimulation (self-oriented), relatedness, and popularity (others-oriented) through interacting with the product or service (i.e. hedonic quality)." This means, positive experiences through and with a product are achieved by designing for the fulfillment of psychological needs. However, this focus on psychological needs when designing for positive UX can become quite vague – it is easier to say, that a product fulfills the need for popularity about a finished product than it is to design a product that will specifically fulfill the need for popularity.

There are two other approaches which are often used when designing positive experiences, and both have their basis in the framework of Positive Psychology [32], the study of the different aspects that contribute to a positive emotional state and the strategies that allow us to achieve it (e.g. [25][33]). Positive Design which was proposed by Desmet and Pohlmeyer [12] addresses three different domains: Pleasure, personal significance and virtue or all three of them. A similar approach was proposed by Calvo and Peters in the form of Positive Computing [7] and combines a number of concepts from Positive Psychology.
The needs-based approach to User Experience, Positive Design and Positive Computing are firmly theory driven. This, in itself is not problematic but can make the application from one context to another quite hard because things have to be contextualized over and over again.

### 1.2 Experience Categories – Previous Research

In a previous study [40, 42], positive experiences were explored in work environments. Participants repeatedly reported similar experiences that form the basis for Experience Categories. These Experience Categories are defined as follows:

- Experience Categories describe qualities within positive experiences that occur either in every experience or in a large number of them.
- These qualities are described as activities because experiences are rooted in activities [17] and this description allows for a more direct application.
- Within an Experience Category there are similarities in the qualities of the facilitating factors (e.g. presence of others, special activities, technology) [40, 42].

In work environments these categories describe themes such as Resonance, Social Support, Challenge, Engagement, Organization, and Communication and New Experiences. A more detailed description of these categories can be found in [40] and [42].

The Experience Categories are extracted from accounts collected using Experience Interviews [40], which can be conducted face-to-face or online. The main focus of that interview is to tell a story from a predefined context (e.g. work or here cooking). This approach is a variation on Flannagan's Critical Incidents method [14] similar to Experience Reports [18] or Experience Narratives [36]. Unlike studies such as Herzberg and colleagues' [22], though, the focus is placed on the experience rather than the underlying factors.

The aim of this project was twofold. First, Tuch and colleagues [37] found that positive (and negative) experiences for work and leisure contexts differ in their need fulfillment. Therefore, we wanted to confirm that Experience Categories can be applied to a leisure context . Second, we wanted to find out whether and how the categories differ between contexts. Since the categories were derived from interviews about work contexts some of them might be specific for work contexts. On the other hand, since we assume that the reported experiences are perceived as positive is because they fulfill our needs, there might be significant overlap between the typical positive experiences found in different contexts. To study this, we chose to explore cooking

related activities as an example for leisure activities and the related positive experiences.

### 1.3 Cooking as example for leisure context

Food engages our senses and connects us with other people [38]. This goes as far as that in a study from 2013 which was commissioned by BBDO 48% of Millennials described themselves as Foodies (c.f. [38]). Technological advances make everyday and menial tasks in the cooking process easier or even remove them completely. We chose to study cooking rather than other leisure contexts because of the duality of this context. It is, in its nature, analogue and yet we are increasingly adding more and more digital components. Unlike other leisure contexts such as writing letters, however, cooking is unlikely to become completely digitized. What is also striking in this context is a perceived split in the literature. One part of the literature reveling only in the potential technological advances have and the other part of the literature points out that the user has to be at the focus of the designed technology rather than the technology itself.

### 1.4 Smart Kitchens and Smart Homes

Life is complex and irregular [5], habits and routines are flexible [11] and often people with different preferences live together [9, 27]. Yet, very often, smart home studies, and smart kitchen research as a sub-field, are driven by simple assumptions, like that life follows habits and routines and if technology could just serve these habits and life becomes more comfortable. Solaimani and colleagues noted that research on smart homes is very much dominated by research on technological developments. Even the few social science oriented research is more focused on studies eliciting technical requirements [34]. Even usability-oriented research tends to have a technological focus, because the question is mostly about how the existing functions can be accessed and used [27, 39]. Bell and Kaye point out that we should focus on the experience in kitchens rather than the underlying technologies [2] and Grimes and Harper[15] extend this argument even further, suggesting that smart kitchens should support positive experiences.

Within smart kitchen research, cooking support systems are rather prominent. They support by recognizing what the user is doing [16] and e.g. augmenting the kitchen environment with cooking instructions to support cooking processes directly on the working surfaces or cooking related objects [31]. Creating videos for cooking processes by a kitchen with an embedded video authoring system [21] is a special way of supporting others. Smart kitchen systems also focus on behavior change, like calorie-aware cooking by feeding calorie information back while cooking [8]. Another way of supporting people in the cooking process is to facilitate the exchange of recipes in a social community [35].

The interaction with digital enhanced kitchens is another focus of smart kitchen research. Examples are studies on interaction possibilities using gesture based interac-

tion [28, 29] or augmenting the kitchen environment with e.g. projected cooking related information [4].
Aizawa and colleagues [1] list relevant research topics concerning smart cooking technologies which are dominated by smart support systems, content management, learning and persuasive technologies as well as safety. Just sensing taste, smell and textures is a topic which addresses the experiential side of smart cooking research. Like in research on smart homes, the technology focus is rather strong. There are exceptions such as studies on collaborative cooking behavior by identifying typical physical interaction behavior of people in their kitchen [30] or describing successful collaboration patterns for social cooking situations [23]. However, there is lack of research on creating positive cooking related experiences by using designing technology accordingly.

### 1.5 Automation at Any Cost?

The focus of technical solutions for smart kitchens on the utility has a drawback. Users are worried that automation will make them passive, lazy, and in the end stupid [27]. A study by Hassenzahl and Klapperich [20] showed that the process of making coffee is perceived as less pleasurable when the process is automated. They argue that even though chores and other household activities take a lot longer when performed manually compared to a (fully) automated process, they offer more possibilities to experience the process, for the senses to get involved, to experience competency. On the other hand, the shorter, automated, situations were perceived as waiting situations with less and weaker positive experiences which, in turn, are crucial for positive User Experience.

## 2 Positive Experiences While Cooking

With the goal of generating experience- rather than feature-driven scenarios that support positive UX we applied the Experience Categories [40, 42] to the leisure context cooking in order to generate new context-specific categories. Experience categories describe the essence of clusters of positive experiences. Each experience in a context can be assigned to a category that describes the situation.

The following study aims to answer the following questions:

1. Are the Experience Categories described in [41, 42] applicable to other contexts? and
2. If not, how do Experience Categories for cooking contexts differ from those for work contexts? and
3. If the Categories differ - what are the “must-have” and “optional” aspects of Experience Categories for cooking contexts?

## 2.1 Experience Categories and Cooking - Study

**Experience Interviews**

Using both the face-to-face and the online version of the Experience Interview [40, 42] participants were asked about a positive experience they recently had while cooking. This was followed by questions about additional information needed to gain a better understanding of the situation such as feelings experienced ("How did you feel?"), activities carried out ("What did you do?"), other people involved ("Who else was there?"), the overall structure of the experience, and environmental factors.

**Sample**

We collected 87 descriptions of positive experiences from 95 participants. 8 participants were excluded because they either did not finish the online version of the interview or did not describe positive experiences while cooking. Participants were from a variety of age groups (mean= 27.84, min=18, max=66, SD=9.28), living in a number of different sized households (mean=2.66, min=1, max=11, SD=1.47). 52% reported cooking mostly alone, 27% with one other person, 4% cook in groups and 17% reported 'other' which was mostly clarified as sometimes cooking alone, sometimes in a group.

Out of these 87 experiences, 5 contained more than one experience and were therefore split up into their individual experiences resulting in 94 experiences that were analyzed further. All participants volunteered and gave informed consent.

**Analysis**

The experiences were first classified by three members of our lab using Mayring's [26] step model for deductive category development and the categories for work contexts [41]. This process is described in more detail in [40–42] but is described here for completeness.

Using qualitative content analysis (Mayring, 2000), the experiences were compared to the experience categories for wok contexts and categorized accordingly. Experiences that did not fit the existing categories were clustered and analyzed. New categories were then suggested by the three coders individually and their overlap compared.

Based on these new categories were decided on and a revised list of categories was assembled by all raters together. The factors (including emotional outcomes) contributing to the positive experiences in these new clusters were isolated. Then all experiences were re-categorized using the revised categories by the raters individually and the pattern with the highest proportion of agreement was chosen (in cases of disagreement the choices were discussed to reach consensus). From this qualitative analysis we compiled a list of reoccurring descriptions and aspects.

**Results**

We will now go through the different groups and categories for cooking contexts describing their similarities and differences. Each group description is followed by a table (Tables 2-6) which lists the must-have and optional attributes within the catego-

ries and their experiential outcome. Following this we describe the differences between Experience Categories for work and cooking contexts (Table 7).

Table 1 describes the identified Experience Cagtegories for cooking. The first column lists the name of the Experience Category. The proportion in percent of the total number of positive experiences is shown in the second column. The different categories are related and can be grouped into the broader clusters 'Resonance & Support', 'Competence', 'Organization', 'Communication', and 'Atmosphere' listed in the 'Group' column. The "Experiences" columns shows the proportion of experiences in the 'Group' related to all experiences.

**Table 1**. Experience Categories and Experience Groups for positive cooking experiences

| Experience Category | % | Experiences | Group |
|---|---|---|---|
| Receiving personal feedback | 7.5% | 31 (33.1%) | Resonance and Support |
| Receiving help | 1.1% | | |
| Helping others | 1.1% | | |
| Learning new skills | 17.0% | | |
| Teaching others | 1.1% | | |
| Doing something for others | 5.3% | | |
| Rising to a challenge | 12.8% | 23 (24.5%) | Competence |
| Experiencing creativity | 11.7% | | |
| Finishing a task | 2.1% | 4 (4.2%) | Organization |
| Keeping track of things | 2.1% | | |
| Connecting with others | 3.2% | 23 (24.5%) | Communication |
| Experiencing community | 6.4% | | |
| Creating something together | 13.8% | | |
| Acting according to one's beliefs | 1.1% | | |
| Remembering & Tradition | 3.2% | 13 (13.8%) | Atmosphere |
| Savoring | 5.3% | | |
| Experiencing something new | 5.3% | | |
| **Total** | 100% | 94 | |

For each of these Experience Categories for cooking we identified a set of "must have" and "optional" attributes that describe this category. 'Must have' are attributes that occur in some form in every experience reported within that category. The 'optional' attributes appear very often and support the description of an Experience Category. With 'must have' and 'optional' attributes it is possible to understand what describes an Experience Category and what make a category different from

other categories. In the following we will list and discuss the "must have" and "optional" attributes for the different categories.

**Group: Resonance & Support**

The group Resonance & Support is the largest group and combines categories that focus on how we interact with others to grow (Table 2). It includes the categories 'receiving personal feedback', 'receiving help', 'helping others', 'learning new things', 'teaching others', as well as 'doing something for others'.

**Table 2.** Experience Categories of group Resonance & Support

| Must Have | Optional | Experiential Outcome |
|---|---|---|
| **Receiving personal feedback** | | |
| positive feedback about performance | feedback from people who were not involved in the activity | pride;<br>validation/affirmation |
| **Receiving help** | | |
| receiving support while performing an activity | community;<br>sharing responsibilities;<br>splitting tasks | appreciation;<br>connectedness |
| **Helping others** | | |
| supporting the execution of a task | community;<br>sharing responsibilities;<br>taking over tasks | |
| **Learning new skills** | | |
| active or passive exploration of something new | End result is unclear | is experienced as enriching<br>joy, fun, curiosity, |
| **Teaching others** | | |
| acting as a mentor ;<br>sharing experiences and knowledge;<br>Intention: teaching others | supporting someone in achieving their goals;<br>showing something new;<br>giving feedback;<br>teaching each other | Feeling competent;<br>pride |
| **Doing something for others** | | |
| positive feedback about performance (afterwards);<br>doing something for someone else | making new experiences possible;<br>letting others participate in experiences | positive feelings during the activity;<br>anticipation |

**Group: Competence**

The group Competence is made up of the categories ‘rising to a challenge’ and ‘experiencing creativity’ (Table 3). These categories are very similar but bear striking differences. In both the experiences described are those of performing a task that is not trivial. However, when experiencing creativity, skills and demand are in a (perceived) balance. When rising to a challenge, the outcome is less clear. Note that Experiencing Creativity often describes experiences that have striking similarities to Flow [10].

**Table 3:.**Experience Categories of group Competence

| Must Have | Optional | Experiential Outcome |
|---|---|---|
| **Rising to a challenge** | | |
| completing a difficult task;<br>positive feedback about performance;<br>satisfaction with results;<br>relief if things worked out | unsure how to solve the problem;<br>working alone or as a group;<br>succeeding in something | pride |
| **Experiencing creativity** | | |
| goal is clear;<br>road to the goal is open;<br>competence (skills needed to complete task are present);<br>cooking freely or tweaking a recipe | taking unconventional paths;<br>responding flexibly to changing requirements | flow;<br>joy and surprise over positive results |

**Group: Organization**

The group Organization is made up of the categories ‘finishing a task’ and ‘keeping track of things’ (Table 4). They include experiences that involve more mundane tasks such as spring cleaning the kitchen or keeping track of a growing shopping list.

**Table 4.** Categories of group Organization

| Must Have | Optional | Experiential Outcome |
|---|---|---|
| **Finishing a task** | | |
| completing tasks and parts of tasks;<br>competence (skills needed to complete task are present);<br>goal is clear;<br>task is not challenging | doing something for someone else;<br>initiating the activity might take some effort;<br>positive feedback about performance;<br>intrinsic motivation | feeling productive |
| **Keeping track of things** | | |

| Must Have | Optional | Experiential Outcome |
|---|---|---|
| perceived control over the situation;<br>perceived competence | Being your own boss | feeling of security |

**Group: Communication**

The group Communication involves activities that foster a feeling of being related to others (Table 5). The category 'connecting with others' involves activities that bring individuals together, allowing them to learn more about each other. 'experiencing community' on the other hand, is experienced with friends and family and the focus moves away from the activity towards the connectedness. 'creating something together' is more active than the previous two categories – here all the exhilarating aspects of teamwork are experienced. Finally, 'acting according to one's own beliefs' is a more introspective category. Here the focus is on making decisions that are in line with a certain belief or goal, such as healthy eating, dieting, reducing waste, ethical or religious restrictions while experiencing that decision as enriching.

**Table 5.** Categories of group Communication

| Must Have | Optional | Experiential Outcome |
|---|---|---|
| **Connecting with others** | | |
| shared activity;<br>connecting with people that you are not familiar with (yet) | guests;<br>having something in common | feeling related to others |
| **Experiencing community** | | |
| working together with people that are liked;<br>experiencing the atmosphere together | taking care | savoring, joy, fun |
| **Creating something together** | | |
| working towards a shared goal;<br>clearly defined tasks;<br>agreeing with others on the plan of action | motivating each other;<br>learning from each other;<br>finishing tasks towards the main goal;<br>relaxed working atmosphere;<br>acquiring new skills | feeling competent and related |
| **Acting according to one's beliefs** | | |
| doing something meaningful;<br>acting on one's own principles;<br>acting of one's own volition | to stand up for something | confirmation, satisfaction |

**Group: Atmosphere**

The group Atmosphere is comprised of more inward looking categories (Table 6). While the experiences can involve others, the focus is on how an individual feels. 'remembering /tradition' looks back to past experiences (either singular ones or reoccurring ones). 'savoring' focuses on the present and 'experiencing something new', which includes experiences with new kitchen equipment that lead to participants speculating on what they could do with them in the future, focuses both on the present experience as well as the future.

**Table 6.** Categories of group Atmosphere

| Must Have | Optional | Experiential Outcome |
|---|---|---|
| **Remembering/Tradition** | | |
| remembering a past (positive) experience | clear structures | feeling secure (through routines) |
| **Savoring** | | |
| experiencing a pleasant atmosphere (food, drink, time in the kitchen) | community;<br>enjoying the experience by one's self;<br>enjoying favorite foods, or drinks | introspection;<br>positive feeling during the activity;<br>anticipation before the activity |
| **Experiencing something new** | | |
| | | Joy, fun, surprise |

**Comparing Experience Categories of work and cooking context**

If we compare the categories found in work and cooking contexts there are a number of differences, for example, the actual categories. Table 7 compares the Experience Categories for work and cooking contexts and their prevalence.

**Table 7.** Comparison of the Experience Categories found for work and cooking contexts.

| Experience Category | % Work | Group Work | % Cooking | Group Cooking |
|---|---|---|---|---|
| Receiving (personal) feedback | 13.5% | Resonance | 7.5% | Resonance and Support |
| Giving feedback | 1.1% | | | |
| Receiving appreciation | 7.7% | | | |
| Receiving help | 3.4% | Social Sup- | 1.1% | |
| Helping others | 5.2% | | 1.1% | |

| | | | | |
|---|---|---|---|---|
| Teaching others | 1.4% | port | 1.1% | Resonance and Support |
| Learning new skills | | | 17.0% | |
| Doing something for others | | | 5.3% | |
| Rising to a challenge | 21.5% | Challenge | 12.8% | Competence |
| Being given a challenge | 3.7% | | | |
| Solving a problem | 1.7% | Engagement | | |
| Experiencing creativity | 2.3% | | 11.7% | Competence |
| Finishing a task | 4.3% | Organization | 2.1% | Organization |
| Keeping track of things | 6.3% | | 2.1% | |
| Acting according to one's beliefs | | | 1.1% | |
| Experiencing community | | | 6.4% | Communication |
| Connecting with others | 4.0% | | 3.2% | |
| Creating something together | 8.3% | | 13.8% | |
| Exchanging Ideas | 4.6% | Communication and New Experiences | | |
| Contributing to something greater | 2.6% | | | |
| Experiencing something new | 5.1% | | 5.3% | Atmosphere |
| Remembering & Tradition | | | 3.2% | |
| Savoring | | | 5.3% | |
| **Total Number** | **349** | | **94** | |

The categories for cooking contexts bear large similarities to the categories previously found for work contexts. We believe this is due to the suspected underlying needs which is currently being studied by our group. However, differences between the two contexts also emerge. Aspects that appear quite crucial for work contexts (such as social hierarchies) are barely mentioned for cooking while other people appear even more important for cooking contexts than for work contexts. Categories also have other aspects that differ from work contexts.

### 2.2 Discussion of the Experience Categories

What this process showed was: (a) Experience Categories can be extracted for contexts other than work. (b) 342 experiences were analyzed in the study that extracted the Experience Categories for work. Here a sample of only 94 experiences allowed us to generate the categories for cooking experiences. While a larger sample would most likely have produced more detailed descriptions of the categories, we believe this

lowers possible barriers for the application of the Experience Categories to contexts where larger samples are hard to find.

Unsurprisingly the categories found for cooking contexts show similarities to previous research. For example, Grimes and Harper [15] describe the fields 'Creativity', 'Pleasure & Nostalgia', 'Gifting', 'Family Connectedness', 'Trend-Seeking', and 'Relaxation'. The experience categories are extracted through a bottom-up approach. Even though the Experience Categories for cooking context were extracted using the Experience Categories for work contexts as a basis, if participants do not talk about certain kinds of experiences, we cannot extract an experience category out of thin air.

Differences between work and leisure from the perspective of Experience Categories:

From all 23 categories 11 can be found in work and leisure context. In work but not in cooking context you can find 'giving feedback', 'receiving appreciation', 'being given a challenge'. 'solving a problem', 'exchanging ideas', and 'contributing to something greater'. Specific cooking categories are 'learning new things', 'doing something for others', 'experiencing community', 'acting according to one's beliefs', 'remembering & tradition', and 'savoring'

For cooking contexts community, savoring and rituals are important. For work contexts, on the other hand, challenges, and connections through work are in the foreground. In those situations community is experienced through the work process and cooperation at work. For cooking contexts community is experienced through the results. At work, the focus is on the bigger picture, while cooking the focus is on the involved parties.

## 3 Designing new Positive Experiences

As we showed for work contexts, Experience Categories can be used as an inspiration aid to generate new positive experiences [24][6][41]. Thus, the categories for cooking related contexts can be used to design positive experiences in smart kitchens.

We will now describe how we use this approach when generating new concepts. The concepts described here were developed during the ideation phase of the research project SmartKitchen at Stuttgart Media University.

As part of this project we ran a series of workshops to use these findings as a basis for new positive experiences. Our focus was on applying what we had learned about experiences while cooking in general to experiences while cooking with smart kitchens. The Experience Categories served both as the research basis as well as the inspiration for these workshops. In the following sections we describe the design process we used to generate concepts for positive experiences in cooking concepts.

### 3.1 Design Process

Using the Experience Categories and groups for cooking we generated activities that represent the categories and clusters within the context. This was done in a variety of brainstorming sessions that included Lego Serios Play workshops.
For example, Remembering & Tradition could be supported through an interaction in which the smart kitchen reminds you that tomorrow is your best friend's birthday and that you made a walnut cake for her last year. Without going shopping, it suggests, you could make a madeira cake for tomorrow.

This generated a large number of possible interactions. To make this number more manageable, the interactions were clustered using the activities of the interactions.

**Grouping of the generated activities into activity clusters**
The clustering of the generated ideas was performed using free clustering. For our context (and they will most likely be different for every context) we found the following activity clusters:

- Exploration (of new recipes, techniques, or ideas)
- Do good to others (caring for others or thinking of them)
- Planning (e.g. a menu, an event, or the weekly shop)
- Documentation (of events, recipes, and experiences)
- Atmosphere (savoring an experience, creating a new one)
- Anticipation (e.g. preparing for a dinner party)
- Improvement (e.g. getting better at a cooking technique)
- Rituals (such as celebrating holidays, or pizza night)

Using these activity clusters we then went back to the Experience Categories to generate ideas for concepts for experiences within a given context (which can then be grouped again and so forth). This means when working on ideas for specific contexts the brief itself does not have to stay as abstract as 'create an experience that will allow the user to establish traditions' but it can be a combination of an activity cluster with an Experience Category. While it might seem as if this adds complexity to the process, we have found that combining Experience Categories with previously generated activity clusters allows for very concrete ideas to emerge. In brainstorming sessions within our lab the effect of this combination was similar to the effect of mash ups in a Design Thinking process.

### 3.2 Concepts

To better explain this design process we will describe two of the concepts generated using the Experience Categories approach. For each concept we generated a scenario which is described below. We will also show an image that exemplifies how this could be integrated in an interface in a smart kitchen.

**Scenario: Remote Cooking** (Figure 1)

In this scenario we wanted to address the activity cluster ‘rituals’ and the Experience Categories ‘experiencing community’, ‘receiving help’, and ‘creating something together’.

Jana loves her mum's signature citrus cake and really wants to bake it for a friend. Even though she has a recipe, Jana feels that her mum has made little tweaks to the recipe that make it ‘her mum’s cake’. Jana’s kitchen has a remote cooking feature which allows her to call people using the call button (red arrow, this could, for example, be implemented using gesture recognition or on a touch screen) while recording the cooking field and the oven. She contacts her mother in Hamburg over video message, so they can bake the cake together despite the distance. While the cake is in the oven they catch up about what they have been up to and their plans for the weekend. Because they can both check on the progress, her mother can also keep an eye on the cake. Jana feels just like when she was younger and helped her mother in the kitchen.

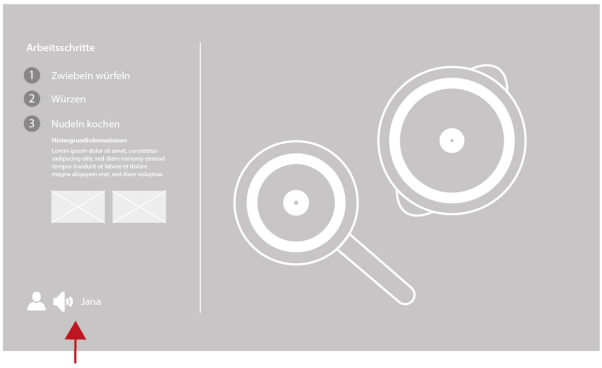


**Figure 1.** Scenario - Remote Cooking – Next to the cooking field the kitchen displays the recipe. At the bottom a call button allows Jana to call her mum and ask for help.

*Design Rationale*
For this scenario several features were specifically designed. These were:

- Both parties can see the work surface and thus the results of the work (receiving help & creating something together)
- Both parties can see each other and their activities (experiencing community and creating something together)
- They can talk to each other (receiving help, experiencing community)

**Scenario: Turning experiences into rituals** (Figure 4)
In this scenario we wanted to address the activity clusters ‘rituals’ and ‘documentation’ and the Experience Categoriy ‘remembering & tradition’.

Every year, Mario and his friends meet for an “asparagus dinner”. This year is no exception. They have a great time cooking their meal and eating it, too. While they

prepare the food the kitchen takes photo of their food at its various stages of preparation. After dinner, Mario and his friends are in the kitchen with a glass of wine and are reminiscing about past dinners. On a display the kitchen shows a slideshow with photographs from previous dinners. Mario and his friends are having a lot of fun recalling the stories related to the photos. When the kitchen suggests setting a date for their next get-together (red arrow, this could be implemented using a touch interface or as a visual reminder that is then responded to using voice controls), Mario immediately creates an invite for everybody because they enjoy these evenings so much.

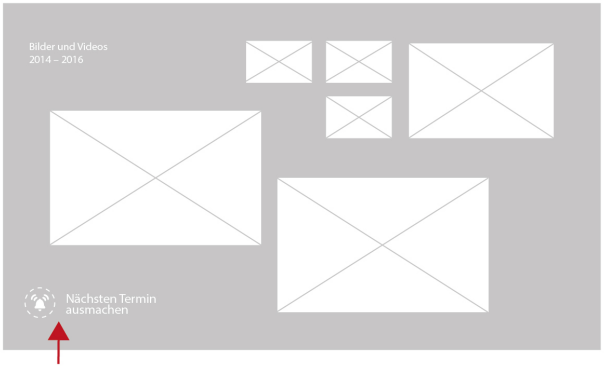


**Figure 2.** Scenario – Turning experiences into rituals – next to photographs from previous dinners, the kitchen displays a visual reminder that suggest already setting a date for the next get-together.

*Design Rationale*
For this scenario several features were specifically designed. These were:

- The kitchen takes photos of the preparation of the food (documentation)
- Photos from past dinners are shown (remembering & traditions and documentation)
- The kitchen suggests setting a date for the next dinner (remembering & traditions and planning as well as anticipation)
- The kitchen only suggests actions rather than taking them automatically. This was a specific choice to allow for greater autonomy of the user.

### 3.3 Discussion of the Scenarios

Based on experience categories and activity clusters we developed 14 concepts for the use in a research project. Two of them were presented here. Experience categories and the activity clusters are driving the creation process from an experience perspective. Requirements like ‘visibility of work activities and results’ are based on the experience categories ‘receiving help’ and ‘creating something together’ in the first scenario. The requirement of continuously taking photos by integrated cameras is based on

the experience category of 'remembering & traditions'. The goal of these requirements is not to generate new technological solutions, but they are supposed to support new positive experiences during cooking. This means the technology used is not necessarily innovative (though, innovative solutions could be used) but the interactions with the technology are designed in a different way. The focus is put on the experience which is then 'implemented' in the concept using technological solutions that will support the intended experience and create new possibilities for positive experiences [13] during cooking and in the context of smart kitchens.

## 4 General Discussion

In this paper we transferred the Experience Category approach to a leisure context. This allowed us to gain a better understanding of cooking experiences and to apply this understanding to cooking in smart kitchens.

We analyzed 94 experiences that were collected using experience interviews. Qualitative content analysis revealed 17 experience categories. The categories are Receiving personal feedback, Receiving help, Helping others, Learning new things, Teaching others, Doing something for others, Rising to a challenge, Experiencing creativity, Finishing a task, Keeping track of things, Connecting with others, Experiencing community, Creating something together, Acting according to one's beliefs, Remembering & Tradition, Savoring, Experiencing something new.

The Experience Category approach was first explored in work contexts. The application to experiences in the kitchen revealed both similarities and differences between the two. For example, "atmosphere" appears as a cluster for experiences in the kitchen which is more-or-less nonexistent in work contexts. Overall all categories are also a lot more social. Work by Tuch and colleagues [37] which explored the differences in need fulfillment between work and leisure activities seems to point in a similar direction. The link between Experience Categories and needs, however, has to be explored further.

The categories derived from our 94 experiences are sometimes based on only a small number of experiences but we believe that even these less frequent categories have their importance. The fact, that they show up even in this small sample suggests, that using just 94 experiences (compared to 342 for work contexts) provides enough data to form a somewhat representative picture of experiences surrounding a given activity. Furthermore, these less frequent categories point to areas where there is potential for positive experiences that is not fully used which means they are areas where new, less obvious, positive experiences can be created.

This approach explicitly focuses on positive experiences. This means they do not specifically solve problems in kitchens. We believe the Experience Category approach should be used in conjunction with traditional design approaches such as Contextual Design [3].

The design process described in the second part of this paper shows how experience categories can be used to design new positive experiences in a context for which experience categories already exist or have just been extracted.

## 5 Conclusion

In this paper we studied positive experiences in cooking related activities and derived Experience Categories for this context. Then we described a design process using these categories. In summary, we found:

- Experience Categories can be applied to leisure contexts like cooking.
- Experience Categories in the leisure context cooking differ from the categories found for work. For example, cooking is more social than work, in that the majority of experiences center around others. The categories also diverge in their hard and soft characteristics. However, there is still a large overlap between the two contexts.
- As with the Experience Categories for work contexts, the categories derived for cooking contexts can be used to design new positive experiences and support creativity, allowing for a multi-faceted approach to a given context such as smart kitchen environments.
- This means the Experience Categories support the design of context-specific positive experiences across a variety of contexts but they have to be established for each context using qualitative content analysis. Either through inductive content analysis of a larger set of interviews, or through deductive content analysis using Experience Categories for a different context as a starting point.

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