



Article

# Designing to the Pattern: A Storytelling Prototype for Food Growers

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**Abstract:** We present the design and pilot study of QuickTales, a mobile storytelling platform through which urban gardeners can share gardening experiences. QuickTales was built as a response to design patterns, drawing on previous studies we conducted with residential gardeners and different gardening communities in a large Australian city. Given the diversity of needs and wants of urban gardeners, the intent for QuickTales was for it to serve as a multi-purpose tool for different individuals and groups across the local urban agriculture ecology. The evaluation provides initial insights into the use of storytelling in this context. We reflect on the use of design patterns to as they were used to inform the design of QuickTales, and propose opportunities for further design pattern development.

**Keywords:** urban agriculture; design patterns; storytelling; interaction design; human-computer interaction

## 1. Introduction

Encouraging gardening in urban environments offers many benefits to the gardener, including positive impacts on their mental and physical health [1,2]. This is particularly relevant in Australia, where the level of urbanisation is almost 90% [3]. Urban gardeners are not a homogeneous group, however, and we draw on previous research of three different types of activity (all conducted in the city of Brisbane, Australia), including individuals and family who grow food at their residence (such as in a back or front garden); a permaculture grassroots organisation that supports home growers; and a city farm community. We have presented more in-depth studies into these groups elsewhere (see [4–6]). In this paper, we explore the use of food related design patterns proposed by Lyle et al. [7], based on the three studies, to inform the design of a storytelling prototype. These patterns seek to respond to the findings of those studies, and suggest several patterns that relate to: the access to resources and physical gardening space that a food grower has access to, and how the activities are situated within their daily lives; the Information and Communications Technology (ICT) that a food grower interacts with, and how it is situated within the local environment; and the connections a food grower has to other people and groups involved in growing activities. Our broader intent with the prototype was to encourage engagement among urban gardeners about their practice of growing food, through the documenting and sharing of their experiences. We then present reflection on the use and applicability of these design patterns as an outcome of a small pilot study. This study, therefore, is situated in a growing body of research that explores and attempts to understand the socio-technical opportunities for supporting urban food growers. The contribution of this study focuses on how the design patterns are applied in the design of the prototype *QuickTales*. Rather than focus on HCI (Human–Computer Interaction) usability, the discussion then reflects on the design patterns based on feedback from an initial pilot study with five people.

*QuickTales* is a mobile application, which can be used to combine photos, texts, and audio into a story, which is then stored online for sharing. The design serves as an iteration on a previous experimental prototype by Foth et al. [8], and seeks to incorporate and respond to design patterns proposed by Lyle et al. [7]. The previous work focused on the experience of preparing and eating food, and encouraged the sharing of pictures of meals at different stages—while cooking, when prepared, and the leftovers (if any) [8]. By contrast, *QuickTales* focuses on the context of food production and growing, and the experiences of different types of growers.

## 2. Growing Food and HCI

Gardening with a purpose of growing food, particularly in urban environments, has been the focus of recent research within HCI [4,5,9–11]. These studies explore communities of urban agriculture, often using qualitative inquiries to build an understanding of their different cases, and propose key opportunities and challenges for HCI designers. The storytelling approach differs from other technical prototypes that relate to food, such as *Foodmunity*, a community application that encourages interactions and a shared experience around eating food by organising events for sharing food [12].

Storytelling as an approach seeks to empower individuals to create stories about their own experiences [13], and has been explored previously within HCI literature [14,15]. Storytelling also presents authors with a creative challenge, and offers them the ability to reflect on these experiences [15]. Furthermore, storytelling offers different insights into the way people engage with the city, as a means of capturing information about local conditions that would otherwise be missed by official reports and documents [16–18]. General purpose mobile digital storytelling platforms have been developed and researched, such as *StoryKit* [19], and *Storyteller* [20]. These platforms tend to serve several different purposes, often in the educational space, but do not respond to specific needs and characteristics of urban agriculture and related communities.

Storytelling has been explored in a variety of contexts including education, history, and civic engagement [17,18,21]. These contexts have also been researched in the field of interaction design and HCI. Chamberlain et al. [22] found that community members in Finland use storytelling to share and reflect on their experiences of foraging, cooking, and eating in the context of the local environment, set apart from the city. Lee et al. [23] explored storytelling in food blogs as an application of a cultural framework proposed for HCI. This focused on storytelling as a textual presentation distinct from video or photography as a means to share information about the food, which differs from the approach taken with *QuickTales*, opting for multiple media types in the story composition.

Outside of the HCI context, Holloway [24] worked to address the disconnect between the non-farming public and farmers, drawing on the potential of storytelling at agriculture shows. This includes improving the understanding of farming practice, suggesting that an outcome of greater public engagement would lead to an economic impact for local and domestic producers.

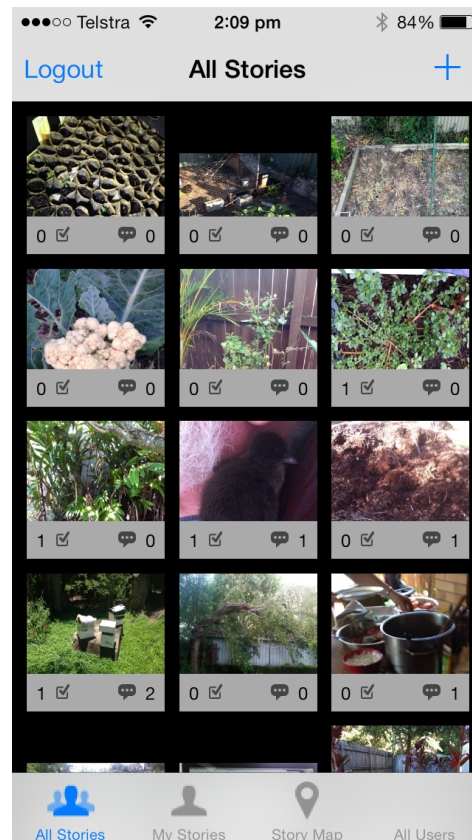
For example, *Bowerbird* ([bowerbird.org.au](http://bowerbird.org.au)) focuses on the value of storytelling as a way of creating a catalog of information, contributing to shared knowledge and providing education. The website allows its users to upload images that serve to catalogue species in Australia, and provide assistance with identifying plants, pests and diseases. The site describes itself as a ‘social, web-based, biological sandpit’, and focuses on the collation of sightings of different species and ecosystems around Australia. The sizeable user base of *Bowerbird* indicates that there is an interest among individuals to connect and share their experiences and knowledge, and the potential for mapping and identifying species. However, its self-description as “a place to share and discuss Australia’s biodiversity” differs from our intention for *QuickTales* to function as a general mobile app for the articulation of any type of gardening experience in the form of multimodal stories.

*QuickTales* also builds on our continued explorations and iterative development of image-based storytelling around food, such as *I8DAT* [8,25]. This particular prototype, in addition to our other unpublished research and design endeavours within a four-year research project about

Food-Computer-Human-Interaction (FoodCHI; [sigchi.org/communities](http://sigchi.org/communities)), provided a starting point for the design of *QuickTales*.

### 3. Research Design

*QuickTales* is a mobile application that allows users to create and share their gardening experiences with each other in the form of stories, each containing images, and optionally: text, audio, and a location. Functionally the application focuses on two main activities, browsing existing content (Figures 1–3), and creating new content (Figure 4). The system requires users to create an account, or login via an existing social media platform.



**Figure 1.** *QuickTales* application screenshots: Browsing stories by grid view.

The process for creating a story involves the user adding one or more images, either from their library or the device's inbuilt camera, as shown in Figure 4. In addition, a textual overlay can be added for each image. Using the in-built microphone, the user can then record audio to provide greater context to the images and text and the overall richness of the story. Next, a location can be included; the location is either determined automatically, or set manually if the story being told happened elsewhere. The story is then uploaded to the cloud. We have made use of Parse ([parse.com](http://parse.com)) as cloud storage and a relational data store.

When viewing stories, users are able to manually scroll through the different images, viewing them with their respective text overlay, or press the 'play' button and have the audio recording playback while the images and text overlays are presented in sequence. The timing is calculated automatically based on the number of images, with a minimum duration for each to ensure that the overlay can be read.

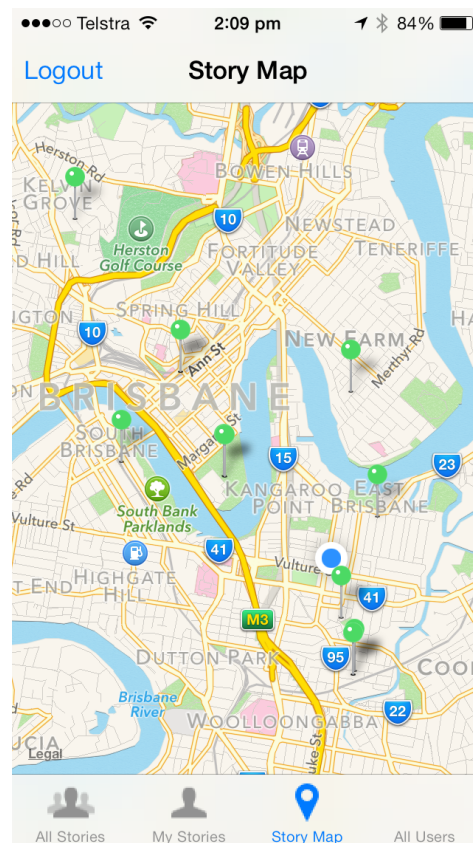


Figure 2. QuickTales application screenshots: Browsing stories by map view.

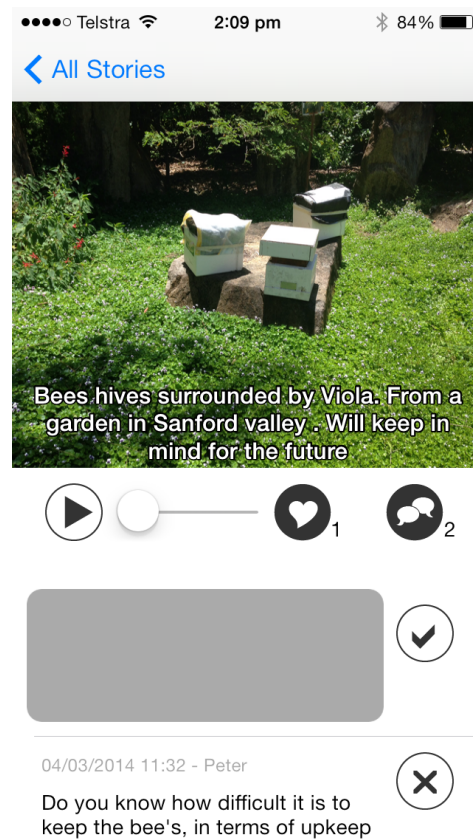


Figure 3. QuickTales application screen-shots: Viewing stories.

The design rationale of *QuickTales* as a prototype application to share stories, is a variation of sharing images as part of the aforementioned system *I8DAT* [8,25]. The purpose of this was to allow for different types of interaction—a story can be about a gardening experience, a response to another story, a journal entry, a reflection on how the garden has changed, and so forth. The open approach to accommodating various types of stories was based on the insights from our previous studies on different types of urban agriculture in Brisbane, Australia—a city farm, a permaculture organisation, and people growing food at their residence—which led to the development of a set of design patterns [7]. As a context of this paper and the related studies, Brisbane is Australia’s third largest city, with over two million residents, and the local municipal government provides resources and information about existing community gardens, and their creation (<https://www.brisbane.qld.gov.au/environment-waste/be-clean-green-brisbane/community-groups/community-gardens-city-farms>).

The design patterns, as mentioned in the introduction, were presented across three categories (note that Lyle et al. [7] suggest these categories also can be further divided based on their applicability to a more physical or digital space). The first related to access to resources and physical gardening space. The corresponding design patterns for this are: *Access to Technology*—addressing the problem that “[g]ardeners can come from any background and as such have a wide variety of access to existing technology...[and] their ability or willingness to use it as part of gardening practice”; and *Urban Living Priorities*—addressing the problem that “[g]ardening demands an investment of time...[and this] competes with other priorities in urban environments”.

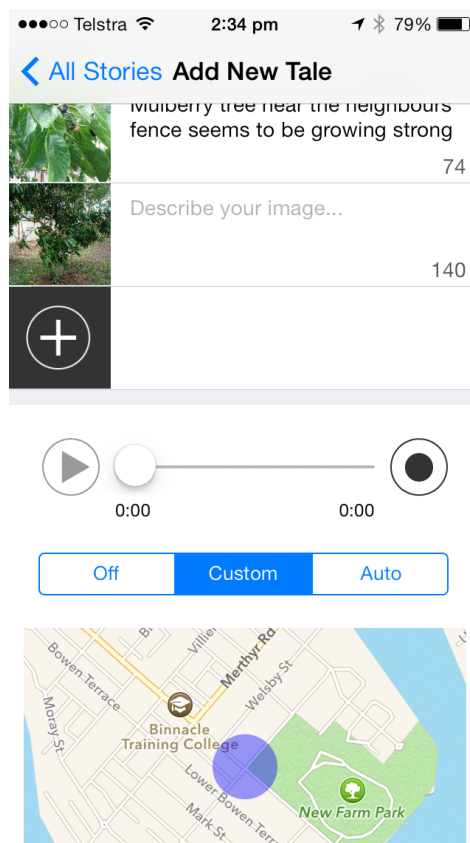


Figure 4. *QuickTales* application screenshots: Creating stories.

The second category related to interaction with information about growing food, and about the local environment. The corresponding design patterns for this are: *Gardening Space*—addressing the problem that “to have a successful crop with specific plants and the level of required maintenance will be dictated by the physical gardening context” and knowledge of what is possible, ideal or hazardous; *Understanding Impact*—addressing the problem of how gardeners gain knowledge of growing food and



understanding why some crops succeed and others fail; and *Local Information*—addressing the issue of gardening information and how it depends on a particular location or environmental situation (which is not always clear when searching online).

Finally, the third category related to the connections between a food grower and friends, family and other communities. The corresponding design patterns for this are: *Community Dependencies*—addressing the problem of capturing knowledge, primarily in the case of food growers involved in communities, such that when a food grower with important tacit knowledge of the communities growing practices leaves, their knowledge otherwise tends to leave with them, *Community Communication*—addressing issues of preferred communication methods in shared physical spaces (such as face to face) become out of sync with digital spaces (such as an online forum), and *Social Context*—addressing the problem of motivation to start and to maintain a garden, and the role of social interactions in facilitating this.

### 3.1. Designing from Patterns

Below we list and describe several design decisions that were taken as a response to the patterns.

- Design for smartphones
- Storytelling as the functional focus
- Composition and presentation of stories
- Use of geographical visualisation of stories
- Support login from existing social media accounts
- Cloud storage of story content

#### 3.1.1. Design for Smartphones

The decision to target smartphone applications was based on multiple factors. Smartphone penetration in Australia in the year of the study (2014) was reportedly at 65%, indicating a high chance that users will be familiar and comfortable with smartphones—even in cases where they do not own one themselves [26]. This likelihood of smartphone ownership and related digital literacies would also reduce a prototype's impact on the limited resources of gardening communities, as we are making use of existing infrastructure. Smartphones, by their nature, are portable, and often allow wireless connectivity to the Internet. This provides gardeners with flexibility to make use of the application in different environments such as the city farm and backyard gardens.

#### 3.1.2. Storytelling as the Functional Focus

Storytelling is flexible. In the field of CSCW storytelling has been used for education, preserving culture, creating history and even promoting healthy eating and activism [14]. In the context of gardening, storytelling allows for increased visibility of urban agriculture in Brisbane, providing an opportunity for gardeners to interact with each other. This can provide a bigger picture of growing activities in Brisbane for city farm members who are curious. It also serves as a tool for reflection on achievements of the past, and to celebrate the work of volunteers in a community organisation such as a permaculture community.

#### 3.1.3. Composition and Presentation of Stories

The use of text, images, and audio, to the exclusion of video, was deliberate in order to reduce bandwidth and backend storage requirements—although it still requires Internet access. The audio and images are considerably larger in terms of bandwidth requirements compared to text; however, this seemed a compromise that still allowed for media rich stories. Ease of use and impact on the time commitment to create a story was important in order to respect the existing but limited resources of gardening communities such as a city farm.

As the text is overlaid on each image, we limited the text such that the overlay will never completely obstruct the upper two thirds of the image. We chose 140 characters as that would be familiar to participants if they had any experience with Twitter. The purpose of this limit was also to minimise the amount of text entry and editing, which on smart phones is cumbersome.

The requirements for a story were minimal—one image. The purpose of this was to try and allow for flexibility between different stories, and to allow for a sequence of different stories (using different media types and of different length) to be effectively considered by the user as one. The story composition also allowed us to reflect on the opportunities for communication breakdown, and dependence on face-to-face interactions in gardening communities such as those that were observed at larger communities. By ensuring the input methods were fast, and allowing for different types of media, the intent is that this could be incorporated into daily interactions between gardeners with ease.

#### 3.1.4. Use of Geographical Visualisation of Stories

As the context of the information is important, a map position is optionally part of the story. The user can choose to automatically determine the location for ease of use, manually specify a location (in order to add some anonymity if they wish to reference a suburb rather than their backyard), or disable it in order to protect their privacy. The view of all stories plotted on a map is shown in Figure 1.

The purpose of the inclusion is to help make visible the different gardening activities that occur in a city for all types of gardening communities. Similarly by looking at nearby stories of gardening experiences, or problems that may have occurred, map positions provide more accurate localised information, and more opportunities for localised community engagement.

#### 3.1.5. Support Login from Existing Social Media Accounts

The system allowed for users to create a dedicated login, or login using existing social media (such as Facebook). This was done to create flexibility, as some gardening communities [4], would prefer to have a closed or separate network, as participants exhibited a lack of trust or interest in public social networks. For residential gardeners, we have found the role of sharing with friends and family is part of the initial and ongoing engagement with the garden.

#### 3.1.6. Cloud Storage of Story Content

Similar to the decision to target smartphones, the intent of cloud storage is to avoid any imposition or resource requirements from gardening communities due to limited resources. We made use of the cloud-based storage solution provided by Parse. Frameworks such as Parse support a large number of platforms, allowing for flexibility in the choice of front-end, and ensure future porting will be straightforward. Cloud-based storage also avoids constraints of having to establish and maintain physical server infrastructure and associated costs.

### 4. Evaluation

We conducted an evaluation with five participants (P1–P5) in October 2014, all of whom lived in Brisbane or surrounding suburbs, in a mixture of urban and suburban houses. Two of the five participants (P1 and P3) had been interviewed as part of a previous residential gardening study. As such we had an existing rapport, and an understanding of their gardening experience.

The recruitment process involved social networks of friends and colleagues, and participants of previous work who expressed interest in our research. Our requirement for participation was that the participant lives in Brisbane or surrounding suburbs, and be involved in gardening for food production, either at home or via a community garden. Information about the participants and their respective garden is shown in Table 1 (the age range of those who reported was 26–37, and all were of working age). While all participants were involved in residential gardening on their own property,

P2 also grew food and other plants at an allotment garden at a city farm, and P4 had previously hosted a permaculture event at their house, in addition to participation at other related events. Each guided evaluation of the application and interview took place over a 20–40 min period.

The evaluation involved a guided process, where participants were shown how to view and create stories in *QuickTales*, and then asked to create a story. After this, participants were interviewed about their typical gardening experience. Participants were free to create their own stories—they were not given any requirements for what their story should be about, or what media it should contain. This allowed the participants to use the system in the way they wished, and us to further observe and gauge their interests and how they might view and interact with the system. Where possible, we conducted the interviews in situ while participants engaged in gardening, at their home. This was to gain better insights into how they might use *QuickTales* in environments where they typically find inspirations for and/or take photos to create stories. For P3 this was not practical or convenient, and as such we conducted the interview in a meeting room at their workplace, and P3 was asked to take pictures on their phone of their garden in advance, for use with *QuickTales* as part of the story creation process. This process took less than 10 min for all participants, and allowed for some exploration of the application after the story creation process.

**Table 1.** Participant Demographics.

Dwelling			Garden
P1	M	Townhouse (Owned)	Backyard (terrace), potted plants
P2	F	Unit (Rented)	Backyard, potted plants and garden bed. Also rents a city farm allotment garden
P3	M	House (Owned)	Backyard garden beds
P4	F	House (Rented)	Backyard garden beds and chickens. Garden overhauled by Permaculture community, February 2014
P5	F	House (Rented)	Backyard (terrace), potted plants

Semi-structured interviews were used to build an understanding of the general gardening experience of the participants, as well as to assess whether the concept of the application was an appropriate design. As such, the types of questions were tailored towards these goals. The general questions included: recent gardening experience, approaches to handling pests and diseases, access to technology in the growing environment, any existing methods of recording food growing activity, and the role of storytelling and sharing information with others. While the participants could mostly talk about their experiences in any way they wanted, if parts of—or their overall—discussion did not answer a particular question, the researcher followed up by explicitly asking questions.

The interviews were recorded, and a combination of annotations and quotes were transcribed from each recording. The findings are the result of manual coding of the annotations and quotes and combining codes into themes. The findings present the result of this process. The discussion involves a process of abstraction, considering how the design of *QuickTales* could improve through iteration.

## 5. Results

We begin this section by introducing the diversity of stories that participants created using *QuickTales*, and then continue with four themes that emerged from responses to interview questions (based on the coding mentioned above). The content of stories that each participant created, in terms of the use of images, text and audio are shown in Table 2. The participants used a mix of the available media options to create their stories, and the topics included: problems in the garden, an overview of their entire garden, and talking about specific work or project aspects of their garden.

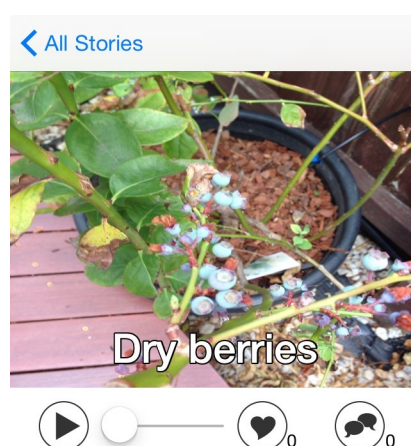


**Table 2.** Stories created by participants during interviews.

	Content	Story
P1	4 images (all with text)	Describes how they are unsure how to make their blueberry plant healthy and productive.
P2	Audio and 3 images (all with text)	Describes a problem with pests attacking cauliflower, being grown for the first time. Is unsure what are ideal temperature and sunlight requirements, or how large it will grow.
P3	5 images (all with text)	A collection of photos of the different areas of P3's garden, showing what is currently growing.
P4	Audio and 5 images (4 with text)	A story about what actions P4 had taken with their chickens in the garden 'cell farming', and their plans for future work.
P5	2 images (all with text)	A story showing the progress with seedlings from starter pots, some of which have now been planted out.

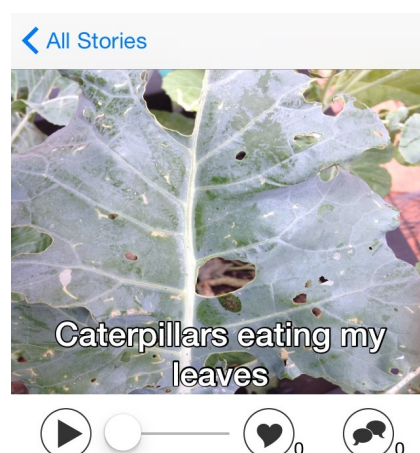
The stories created by participants were diverse: For P1 and P2, they created stories about problems they had encountered. P1 took photos (no audio) of a blueberry plant, shown in Figure 5 that he described initially as 'sick' and later in the interview as 'sad'. He expressed difficulty in describing the problem:

"I wouldn't know how to describe this area of the plant, you see how it doesn't have a lot of leaves?" (P1)

**Figure 5.** An image from P1's story about his blueberry plant looking unwell.

P2 and P5 had moved to Brisbane, and expressed difficulty adapting their existing knowledge (from USA for P2, and Tasmania for P5) to the local climate. P2 similarly chose a problem within her backyard garden, taking photos, recording audio and providing a location as part of her story, describing a cauliflower plant that was being eaten by insects, shown in Figure 6. P2 described her own food growing experience as limited, and her knowledge of gardening practice as primarily informed by volunteer work conducted at a community garden in the USA. She was aware that her experiences in the USA would not necessarily apply because of different soil, pests, and the Australian climate:

"I don't understand all the Australian, ... weeds and all that, ... I see a big cricket that likes my food, the possums have eaten practically all my spinach..." (P2)



**Figure 6.** An image from P2's story of a cauliflower plant raided by pests.

P5 did not create a story related to a problem in her garden, but discussed difficulties that she experienced when adapting to a different climate in terms of pests (having moved interstate in the preceding year):

"It's completely different moving to a new climate, and it's driving me [crazy]." (P5)

Participants expressed two other contextual factors that influenced their response to problems they encountered: personal values and practical limitations. Firstly, when searching for information online, P2–P5 all mentioned their preference for organic solutions as important to their gardening approach. P2 and P3 gave examples where they had found several suggested options for dealing with a particular pest, and they dismissed options involving pesticides or other methods of killing pests in favour of organic options.

Secondly, a practical limitation experienced by P3 when trying to deal with the issue of snails was that, in addition to his own values, he also owned a pet dog that further complicates the type of solutions and responses to garden problems:

"If someone says, well, I get the [snail] pellets, I would say 'do you have a dog?' or 'is your garden up high where a dog can't get it?' and if they said 'well I don't have a dog', ... I can't use pellets if I have a dog" (P3)

Beyond the stories and initial reflections on food growing practices as part of the story creation process, we introduce the themes that emerged. These themes relate to the categories and quality of stories, preferences for different media, the time invested in growing food as a hobby, and reflections by participants on their food growing experience.

### 5.1. Categories of Stories

All participants mentioned that having more visible descriptions, or different categories, and the ability to search and filter on these options would increase the utility of the application for their purposes. This would be a valuable feature to increase the utility of a storytelling platform. P1 and P2 both suggested that 'problems' be a clear category, and P2 said she would like a category for people wishing to trade seed or plants. P3 suggested that trading gardening tools would also be useful. P4 found the tags in her blog useful, and P5 referred to familiar tagging systems as something that would be familiar and useful for categorisation.

In terms of what filtering or sorting would be of interest, P1's first response was by plant then problem, after he was prompted for location, he considered:

“If there were two stories that I think talk about a similar blueberry problem that might be relevant to my problem, I would first choose to look at the one that is closer to me physically.” (P1)

### Quality Control and Reputation

In terms of evaluating the quality of information, P1 referred to a reputation system employed by Stack Exchange ([stackexchange.com](http://stackexchange.com)) in several web-based question and answer systems. Stack Exchange allows users to vote up and down questions and answers based on their accuracy or usefulness, and the question author to indicate which answer solved their problem. Although Stack Exchange began with a system for software developers, it has since expanded to include a large number of other fields and domains, including gardening.

### 5.2. Multimedia Preferences

The recorded audio component of a story was not required, and consequently only two participants created a recording as part of their story. For those who did not record, there were multiple reasons related to familiarity of the media type (P2), and consideration for who the audience might be (P1). It is interesting to explore why people prefer different multimedia types. During the interview P1 explained in detail the story of when he first got the blueberry plant, moving it to different locations on his veranda for more or less sun, shifting it to a larger pot as he thought it was root-bound setting up an irrigation system to help automate his gardening process, and his thoughts on why the plant was unwell. The reservation to record audio was not that he was unable to provide detail for his story, but rather the recording and sharing of his voice, which he considered more personal. I inquired whether a speech-to-text service would be preferable and he expressed two reservations—the quantity of text would still be difficult to edit, and the way he talks is different to the way he writes. P1 would prefer to story sync to his desktop computer, and provide a detailed description to accompany the story, which would be feasible given cloud storage, and the flexibility of the development framework.

Participants also reflected on how the story was read and heard, and issues of making sense of the text overlays, images and audio, which—all produced separately—can make a story difficult to follow:

“As I listen through the story, for me, it was very difficult to pay attention to what she was saying, and read the text of the images at the same time.” (P1)

Regarding other multimedia, participants suggested video, recalling other familiar systems like the Vine platform (suggested by P5). P1 also indicated a level of comfort and familiarity with video as a means of sharing. He mentioned regular video calls on his laptop with international relatives, and as they often visit, he will sometimes (when the weather suits) pick up the laptop and take it outside so he can talk to them about his experiences and progress in the garden. Given all participants had smart phones, and access to relatively high-speed Internet in their home growing environment, our concerns about bandwidth issues were overly conservative.

### 5.3. Hobby Tracking

P1, P2 and P3 did not currently engage in any sort of logging or tracking of their progress in the garden, and all mentioned that it was a hobby, and the scope of their gardens meant they could remember sufficient information about their experiences:

“...it’s just a hobby, right, so I guess by it deteriorating, it gives me something to do every couple of months, and you sort of clean it up, and then you feel good about it being cleaned up again.” (P1)

By contrast, P4 and P5 made some records of their gardening experience, and both had started blogs (and had both said they did not update it as often as they would have liked), as well as taking

photos of different events. P4 did make use of written notes, and found the mixture of notes, photos and blog posts helpful to reflect and see the progress:

“I can get a sense of how quickly stuff is growing... Make little sketches, take a lot of photos on the phone, just of nice stuff.” (P4)

P5 also used photos, and posted updates to Twitter, citing the short format as quick and accessible. P4 told us of how keeping records of gardening was useful to share with a friend who had given her lemongrass and a story of its progress from a bulb into a plant:

“This lemon grass here, started from some little bulbs that a friend gave me, and so she came over and she’s like ‘wow I can’t believe that these little bulbs have turned into this big thing’... I was able to look back and see when I’d done it so I could see how quickly the lemon grass had turned from like just one little stalk into something big, so it’s just nice to know what’s going on.” (P4)

Similarly reflecting on experiences serves as a means of remembering which gardening experiments did not work and to avoid similar problems:

“I planted some stuff down there” (gestured to part of the garden near to the property) “that didn’t work, and because I had a record of it I know like, I don’t plant stuff like that down there anymore.” (P4)

P4 and P5 were also the only two participants unlikely to have their smartphone readily available when gardening. P5 explained this choice as deliberate, that gardening was her escape from technology:

“I don’t normally take my phone out because it’s my time to get away from technology um, because it’s sort of my escape from it.” (P5)

#### As a Time Investment

Providing some context to the tracking of hobbies, here we also highlight the typical time each participant invests in their food growing. P1 had invested 6 h in the previous two weeks, maintaining trees he felt a sense of ownership of, despite being just over the border on body-corporate land. He describes his typical involvement as closer to 1 hour per month. P2 had invested 5 h in the previous two weeks preparing a garden bed, slightly more than typical which she described as 1–2 h a week. P3 had invested 2 days in his garden in the previous two weeks—preparing for an upcoming social event, but typically less in the form of maintenance. P4 had invested 8–10 h on the weekend in the previous two weeks—her typical involvement, however, is approximately 6 h per week, as part of daily maintenance. P4 lamented the lack of time she has to invest in gardening and that despite being a hobby:

“[Gardening is] definitely an important part of my identity, and when the garden isn’t going very well I just feel really lousy, as like an unsuccessful person, it’s definitely like, because I really want this to be a productive garden.” (P4)

P5 had invested 4 h in the garden in the previous two weeks, but normally only performs small maintenance tasks for a few minutes per day. The user study was conducted in October of 2014, the middle of spring in Australia, and multiple participants indicated the seasonal time of year as responsible for their levels of time investment.

#### 5.4. QuickTales as an Opportunity to Reflect

P1 and P2 both had realisations during the evaluation of *QuickTales* regarding aspects of their gardening and decision-making. P1, when telling the blueberry story, explained the information and decisions were based on the information card included with the purchase of the plant, which was

still sticking out of the pot. P1 read through it and after re-reading felt he had a different idea of what might be wrong with the plant (that it might need organic matter more than water to recover). P2, when describing how she evaluates the quality of information, realised that she had not been considering location, and thought:

“... now that I talk about it I should probably also do it based on region.” (P2)

This reflection also brought to the forefront some insight as to an immediate source of information about the gardening process, when P1 and P3 both referred to the information on the seed packet or plant at the time of purchase as their main source of justification for how they maintained and grew the plant (with varying levels of success):

“[I] read what’s on the back of the pack, plant it, see if it works ... I assume that anything written on the back [of the seed packet] is therefore already more knowledgeable than I am.” (P3)

## 6. Discussion

As the approach presented involved the use of design patterns that were themselves the result of multiple studies [7], this provides an opportunity to reflect on their role. Design decisions, such as the choice not to use video, based on findings with community gardens, where resources are different (such as bandwidth and back-end storage), when compared with individuals in their backyard. For instance, for individual gardeners there seems more reliable access to high speed wireless Internet, so issue of bandwidth is less relevant. Several other findings point towards an improved experience of sharing stories: The ability to search, filter and categorise stories; the multimodal media composition of stories and their content; and the way in which the season shapes the context of evaluation. The sections that follow are consistent in name with the respective pattern introduced by Lyle et al. [7].

### 6.1. Access to Technology

The design of *QuickTales* considered *Access to Technology* deliberately targeted a mobile platform. The studies that led to the design patterns involved diverse communities (in terms of budget, ICT infrastructure, interest in growing different types and quantities of food), and thus it was looking to more general demographic trends in Australia that led to the choice to use a mobile platform. For scales of urban growers beyond the individual or family, where community support funding is limited, when combined with a general appreciation of resourcefulness within volunteer communities, also supports the use of personal mobile phones for our purposes. Our decision to avoid video for bandwidth reasons was ultimately conservative for the purposes of this pilot, as was evident from the accessibility of high speed Internet. Responding to gardeners’ access to technology requires an understanding of the wider community’s existing infrastructure, as well as their ability to invest. In conjunction with the *Urban Living Priorities* pattern below, this pattern could also be improved to challenge assumptions regarding the need or willingness to use technology (such as P5 who used gardening to avoid using her phone), not just whether it is accessible.

### 6.2. Urban Living Priorities

*Urban Living Priorities* applied to *QuickTales* with regard to the simplicity of the user interface, and the use of a mobile platform. The mobile device allows for the creation of stories anywhere internet is available, as the photos can be sourced from the user’s existing library. Reflecting on the results of this pilot study—the pattern highlights the need for ease of accessibility of *QuickTales*, as well as to fit the level of commitment to gardening of the individuals, families and groups. Further exploration of this pattern, especially in the case of individuals and families growing in a residential context, would provide an interesting point with which to improve this pattern. Conveying clearly both the commitment required and potential benefits of using a platform, such as *QuickTales*, would allow potential users to assess and consider incorporating it into their daily practice.



### 6.3. Gardening Space

In the first instance, understanding the potential and the use of land was not explicitly addressed in the design, beyond simply the opportunity to share and discuss about the space through the application. Perhaps more interestingly, when considered alongside the temporal dimension, the time spent in the garden ‘recently’ compared with ‘typically’ among participants seemed indicative of seasonal changes. As a general comment on the priority of gardening in the scheme of urban life, understanding the season is a consideration that incorporates temporal and spatial aspects of the local context. This highlights the importance of understanding the season as it is an element of the context in which design interventions take place. This study was conducted in October 2014, in Brisbane, which was in the middle of Spring. If an evaluation is to be repeated or built upon, this contextual information must be made clear. If we were to test *QuickTales*, or a similar application over several weeks as system evaluations often occur, participant interest in the novelty of the system may vary considerably between Spring, and the middle of Winter. Similarly if this study was conducted at the same time of year, even elsewhere in Australia, the type of gardening activity would be subject to the conditions of the local environment and therefore impact how they might use an application such as *QuickTales*.

### 6.4. Understanding Impact

The desire to understand one’s own role and impact when growing food responds to different needs, depending on the type of individuals or groups. This came across through broader user engagement design: to allow participants to create stories, and then visually inspect other stories based on location. We responded simply to these requirements by plotting the user stories on a map.

The value of creating stories over time as a means to reflect on gardening progress was understood by P4 and P5 who had already used a process of recording a journal of their experience. The remaining participants saw less value in logging their regular activities, as their commitment to growing food ‘as a hobby’ meant less change to monitor: P1 for instance could clearly articulate the story of all movements and actions taken with his blueberry plant over a long period of time, without having recorded it formally.

Reflecting on the results of this study—this pattern is well reflected at the heart of the design of *QuickTales*. The pattern itself is concerned with reflection on stories as a means of motivating ongoing engagement in gardening, as well as contributing to observational learning. The positive feedback from participants about prior journaling would suggest this pattern is significant for residential gardening. The context of the pattern could be changed to emphasise this benefit.

### 6.5. Local Information

The design of *QuickTales* considered the local relevance of information through the use of location data, and of plotting stories on a map. *Local Information* would be better represented by *QuickTales*, after a meaningful amount of content had been created, and after the implementation of categories and tagging in order to filter relevant stories. Participants indicated a desire for organising the different stories and knowledge stored within the platform. Not only would this improve the ability for users to log their own activity as a journal, it would also allow them to use existing stories as a knowledge base of problems and solutions. The result would allow for collaborative sorting to develop a folksonomy of stories [27]. Given the prevalence of tagging in social media platforms like Twitter, and on blog/news sites, this finding was not unexpected. Creative suggestions also included the ability to share gardening tools, as well as trade produce and seeds with other users, which would respond further to the needs of permaculture communities [4]. This pattern, and *Understanding Impact* before it, point to the need to consider people in particular, for whom the local environment is foreign (such as the case of P2 and P5).

### 6.6. Community Dependencies

The *Community Dependencies* pattern is concerned with the preservation of tacit knowledge [28] in gardening communities. The design of *QuickTales* provides a means of capturing this tacit knowledge through the stories. In terms of encouraging autonomy among individuals and communities, *QuickTales* provides a method to capture information.

Reflecting on the results of this study—similar to *Gardening Space*, the effect of this pattern is less direct. *Community Dependencies* in particular has greater relevance to gardening communities rather than to individuals, as community gardening information is lost when community members leave. The pattern could be improved by emphasising the need for methods to manage, or, in the case of *QuickTales*, to sort and filter the captured knowledge. Beyond acting as a way to document existing practices, the flexible nature of the story format offers the possibility of *QuickTales* use for planning future events or gatherings. For instance, the story pictures could highlight areas of a garden space where work will commence, with the overlay text, description, or comments used to elaborate on the plan.

### 6.7. Community Communication

The composition of stories was interesting, especially with regard to audio. It became evident that participants would feel more comfortable talking to a video than just record their voice to accompany images. Our justification for this decision was to be considerate of bandwidth use. However, all participants had access to mobile data networks, and most had high speed Internet access from their garden. The brevity of this initial evaluation would also contribute to the lack of user familiarity with *QuickTales*, which could contribute to the apprehension to record audio. This would contribute to the known issues of ‘performance pressure’ [15] as their recordings would be shared with a community of other gardeners that initially would be unfamiliar.

### 6.8. Social Context

Including short videos similar to the Vine platform (as suggested by P5) could be trialled. However, this would pose higher requirements both for upload/retrieval and data storage. It is likely the data storage requirements impact would be greatest, making it difficult to find cheap or free hosting. Video therefore is likely useful in the context of residential gardeners, as the infrastructure limitations of community groups would be difficult to justify. Alternatively, if growing communities made use of an established service, such as Instagram and Facebook, and used it to document their gardening experience, this might provide a compromise. Engaging with existing systems has the potential to lower the barriers to entry due to a greater familiarity, however, existing systems are general purpose, and the ability to foster engagement and empower gardeners in their gardening activity, both at home, and especially in the case of established communities, would still be necessary.

For established communities (e.g., at a city farm), where all participation happens within a shared physical location, reservations have been expressed towards engaging with open networks. The current implementation of *QuickTales* allows for deployment of separate instances of the back-end, and as such, a closed and community specific environment is straightforward to configure.

## 7. Conclusions

This study has explored the design and pilot evaluation of *QuickTales*, guided both by design and reflection of design patterns. Our evaluation explored the concept of storytelling as a way of sharing gardening experiences. The user study provided detail of how the prototype design can be improved, as well as a reflection on our design justification—e.g., for story composition, video may have greater system requirements in terms of bandwidth and storage, but is a more familiar medium than audio recordings in Australia where other platforms are readily available.

Given prior gardening activity by participants, we suggest that future research conducted include not just time and location for where research is conducted, but also to articulate what this means in terms of seasons, and the level of gardening activity within that context. Longitudinal studies would be more suited to observe seasonal trends in gardening activity, and be able to account for this factor.

The prototype evaluation was limited in scope, and as such its focus was on understanding the connection between the design approach and the gardeners experience. The future direction of *QuickTales* would be to incorporate the findings through a further iteration of design. A new version could be evaluated for an extended period of deployment with different types urban gardeners, similar to the different types that were studied prior. Alternatively, the system design could transition to a more general-purpose storytelling application, re-branded and applied in other contexts where location information is important, and the intent is to empower users to create and share short stories. The design of *QuickTales*, by virtue of the small scale and controlled nature of the user study, did not consider potential issues surrounding the use of sharing content—similar to social networks—including privacy, exhibitionism, visual exploitation of people/circumstance, and surveillance. Future iterations and user evaluations that involve a less controlled interaction with the prototype would need to factor these issues.

There is scope to build on the proposed design patterns and explore other aspects across the different studies of urban agriculture. These could include the importance of locally relevant information; how to understand and make effective use of gardening space, and; the ways gardeners interact with their local communities.

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