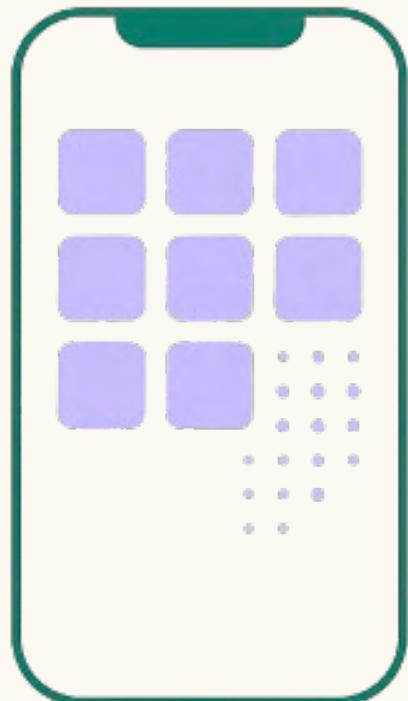


Clémentine CUREL

Master in Digital Project
Management & Digital Strategy



Frictionless Design, Finite Memory

A Study of App Clips and Constraint–Driven
User Engagement

How does the combination of frictionless onboarding and photo limitation influence participation and content quality in ephemeral mobile photo apps?

Academic Year: 2024-2025

Abstract

This thesis explores how the combination of frictionless onboarding and constraint-driven design influences user participation and content quality in ephemeral, event-based photo applications. The research is grounded in the creation and field deployment of Disposable, an iOS application and App Clip that enables participants to join temporary shared albums via QR codes, contribute a limited number of photos, and experience a delayed collective reveal.

Drawing on prior studies in frictionless user experience design, constraint-based creativity, and social computing, the project applies these theoretical foundations to a practical case. The methodology combines qualitative and quantitative approaches, including iterative field testing during family gatherings, festivals, and private events, participant feedback surveys, and in-app usage telemetry.

Results show that frictionless onboarding through the App Clip lowered entry barriers, facilitating adoption across diverse age groups and technical backgrounds. The photo quota encouraged deliberation, reduced redundancy, and heightened the perceived value of each contribution. Meanwhile, the delayed reveal mechanic generated anticipation and strengthened collective emotional payoff. However, limitations such as iOS exclusivity and lack of discoverability constrained wider adoption.

The study concludes that integrating frictionless access with creative limitations can positively shape participation patterns and content outcomes. It contributes design guidelines for ephemeral media platforms and highlights directions for future research, including cross-platform development, flexible quota systems, and integration with physical media.

Keywords

Frictionless onboarding; constraint-driven design; ephemeral media; event-based photography; mobile user experience; App Clips; participatory design; creative limitations; digital participation; delayed reveal; social computing; user engagement; collective memory; design constraints; human-computer interaction; digital strategy; ephemeral design patterns; mobile innovation; UX evaluation; product experimentation.

Abstract.....	3
Keywords	3

CHAPTER 1 - INTRODUCTION

Context.....	8
Problem Statement	9
Project Origins.....	10
Objective & Scope	12
Specific Objectives	12
Scope of the Thesis	13
Academic and Practical Relevance	14
Research Question & Methodology Overview	15
Research Question	15
Rationale	15
Methodology Overview	16
Ethical Considerations	17
Scope of Generalisation	18
Transition.....	18

CHAPTER 2 – THEORETICAL & TECHNOLOGICAL FOUNDATIONS

Frictionless UX and Instant Experiences	19
The Rise of Frictionless UX.....	19
Frictionless Technologies in Practice.....	20
Friction vs Engagement: Finding Balance	21
Designing with Constraints	22
Constraints as a Creative Force.....	22
Examples of Constraint-Based Design.....	23
Constraints in Disposable	23
Behavioural Impact.....	24

Constraints vs Limitations	25
Temporary Events and Collective Memory	26
Event-Based Photography as Shared Authorship	26
Delayed Viewing and Emotional Payoff	27
Temporal Design: Aligning with the Event's Rhythm.....	27
Group Connection Through Shared Storytelling.....	27
Accessibility Across Generations.....	28
Understanding Generational Digital Gaps	28
Reducing Intimidation Through Simplicity	29
Designing with Empathy	30
Accessibility as Shared Design.....	30
Trust, Privacy, and Participation.....	31
Participation Without Identity.....	31
Transparency and Control	32
Avoiding Surveillance Culture	32
Building Trust Through Design	33

Chapter 3 – Implementation

Architecture Overview	34
System Overview	34
App Clip vs Main App	35
Event Creation and Join Flow	36
Camera and Upload Logic.....	37
Gallery and Reveal Logic	37
Offline and Fallback Design	38
Ethics and Security Considerations.....	39

Chapter 4 – User Testing & Field Feedback

Field Deployments	40
-------------------------	----

Early Testing in Small Groups	40
Easter Family Gathering.....	42
Printemps de Bourges Festival	43
Birthday Party	44
User Behaviour and Patterns	45
Spontaneous Onboarding.....	45
Reactions to Limitations	46
The Importance of Pseudonyms.....	47
Preference for In-App Capture.....	48
Contribution and Drop-Off Patterns	49
User Feedback and Sentiment	50
Ease of Use.....	51
Reactions to the Photo Limit	52
Emotional Impact of the Reveal.....	52
Feature Requests.....	53
Overall Sentiment.....	53
Validity and Limitations	54

Chapter 5 - Analysis and Discussion

Frictionless Onboarding and Participation.....	56
Participation and Contribution Quality	58
Emotional and Social Dynamics of the Reveal	60
Case Patterns Across Contexts.....	60
Quantitative Patterns	60
Interpretation.....	61
Cross-case Synthesis	62
Synthesis	62
Validity and Limitations	63
Explanatory Discussion	63
Contributions of the Study	65

Theoretical Contributions.....	65
Practical Contributions	65
Methodological Contributions	65
Future Work.....	66
Chapter Summary	68

Chapter 6 - Conclusion

Summary of Findings	70
Contributions of the Study	71
Theoretical Contributions.....	71
Practical Contributions.	71
Methodological Contributions.	71
Limitations.....	72
Future Directions	72
Closing Reflection	73

Bibliography

CHAPTER 1 – INTRODUCTION

Context

Over the past two decades, the way people capture, share, and store photos has undergone a radical transformation. Once limited to rolls of film and physical albums (Chalfen, 1987), photography has now become a ubiquitous digital practice, embedded in the daily lives of billions of people worldwide (Van House, 2011). The proliferation of smartphones with high-quality cameras has turned photography into an almost automatic reflex: every gathering, journey, or fleeting moment can be instantly captured, stored, and shared.

This transition has enabled an unprecedented abundance of images. It is estimated that more than 1.4 trillion photos are taken globally each year (InfoTrends, 2017), the vast majority never leaving the personal galleries of individual users. While cloud services such as iCloud, Google Photos, and Dropbox have made storage seamless, and social platforms such as Instagram, Snapchat, and TikTok have turned sharing into a ritual, this abundance has paradoxically led to a form of digital fatigue or “photo overload” (Sarvas & Frohlich, 2011; Whittaker et al., 2010).

The very ubiquity of digital photography has created new problems. Events such as weddings, birthdays, or festivals generate hundreds of photos across participants, yet there is no simple, universal mechanism to collect and relive them collectively. Photos remain scattered across personal devices, group chats, or temporary links, and many are never shared at all. The cultural significance of shared photo albums—once a unifying family ritual—has diminished in the face of fragmentation and oversaturation.

At the same time, a counter-trend has emerged. In reaction to the hyper-curated, hyper-abundant nature of digital media, users are gravitating towards experiences that are more ephemeral, constrained, and authentic (Kofoed & Larsen, 2016). Applications like BeReal, which prompt users to share a single spontaneous photo at a random time, and Lapse or Dispo, which mimic the delayed gratification of film cameras, illustrate this return to intentionality (Leaver et al., 2020). By limiting when and how photos are captured, these platforms reintroduce anticipation, surprise, and collective ritual.

This dual landscape—digital oversaturation and a yearning for intentional scarcity—provides the foundation for Disposable. The project aims to merge the nostalgia of disposable cameras with the affordances of mobile technology, creating

temporary, event-based photo-sharing experiences that are inclusive, frictionless, and emotionally engaging.

Problem Statement

Despite the abundance of photo-sharing tools, creating meaningful, collective memories remains surprisingly difficult. Contemporary platforms excel at technical efficiency—instant transfer, unlimited storage, automatic synchronisation—but they rarely prioritise the emotional experience of sharing. Their interfaces are functional but often lack warmth or ritual; they optimise for storage and distribution, not for togetherness (Odom et al., 2012).

This gap becomes particularly visible in social gatherings. During weddings, birthdays, festivals, or vacations, attendees often take dozens of photos each. Yet these images remain fragmented:

- Some circulate via ephemeral channels like WhatsApp, Messenger, or AirDrop.
- Others are uploaded to cloud drives, sometimes password-protected or requiring accounts.
- Many remain locked away in personal devices, never seen by the group.

Even when groups make efforts to consolidate photos, the result is frequently partial, inconsistent, or delayed. The emotional intensity of the event has passed by the time albums are gathered, undermining the sense of collective memory.

More importantly, **current systems systematically exclude certain participants**. Younger users may navigate app downloads, logins, and shared drives with ease, but older relatives or less tech-confident guests often find these barriers prohibitive (Waycott et al., 2015; Helsper & Reisdorf, 2013). A wedding album that omits grandparents' photos, or a festival gallery inaccessible to half its attendees, undermines the very purpose of communal memory.

Recent grassroots behaviours highlight unmet needs. For instance, some groups of friends on TikTok have documented practices such as creating private Snapchat groups during trips, uploading photos throughout, but delaying the reveal until they reunite. This form of voluntary constraint turned sharing into a collective ritual, generating anticipation and enhancing the sense of occasion (Rieger et al., 2017).

These observations lead to a central insight: people do not simply want to share photos; they want to experience the act of sharing as part of the social ritual of gathering.

Yet, no mainstream platform currently provides a seamless, joyful, and inclusive way to collect and relive photos together, in real time and without friction. Most systems require:

- Accounts and logins which discourage casual participants.
- Unlimited uploads, which overwhelm rather than curate.
- Individual-centric interfaces, rather than event-based communal design.

The challenge is therefore twofold: reducing technical friction while introducing meaningful constraints that foster inclusion, creativity, and emotional connection.

Project Origins

The idea for Disposable emerged not from abstract market research, but from lived family experiences that revealed the emotional, practical, and generational challenges of photo sharing.

The first and most powerful source of inspiration was my grandmother. She represents a large group of users often overlooked by technology designers: older adults who are not digital natives (Clark & Dias, 2016). She does not download new applications, rarely uses cloud platforms, and finds the interfaces of modern tools overwhelming. Yet, she loves looking at photographs—especially of family members she does not see often. After every event, she asks to see “all the photos,” not just the few that are shown to her on someone’s phone. Her desire is simple and deeply human: inclusion. She wants to be part of the collective memory, but she is systematically excluded by the technical barriers of today’s sharing tools.

My mother represents the opposite end of the spectrum. She is an enthusiastic family photographer, always with her phone in hand, capturing dozens of pictures at each gathering. For her, the problem is not in taking photos but in distributing them. Group chats overflow, AirDrop is useful only in proximity, and cloud drives confuse recipients. She wants immediacy—being able to share while the event is happening, in a way that is lightweight and does not require long explanations. Her need highlights the challenge of friction: existing tools make sharing cumbersome, which reduces spontaneity and reach.

Finally, my sister's wedding crystallised these reflections. Like many couples, she wanted every guest to contribute their perspective—not only the staged, formal photographs but also the candid, fleeting moments: children playing, laughter during dinner, quiet conversations in the corner of the room. She did not want to rely solely on a professional photographer, whose presence, while valuable for certain parts of the event, is both expensive and limited in scope. A professional can capture the ceremony, but not the hundreds of small moments that make the night unforgettable. My sister wanted every guest to be part of the album, regardless of age, technical skill, or familiarity with technology.

When these three perspectives—my grandmother's exclusion, my mother's desire for easy sharing, and my sister's wish for comprehensive coverage—came together, the design gap became clear. Existing solutions were not appropriate:

- Professional photography is high-quality but costly and partial, suited to formal highlights rather than the full event.
- Cloud services like Google Photos or iCloud offer storage but require logins, accounts, and a certain level of technical literacy.
- Messaging apps (WhatsApp, Messenger) are convenient but disorganised, with compressed photos, scattered threads, and missing contributions.
- Social networks can host albums, but often exclude those who are unwilling or unable to create accounts.

What was missing was a universal, low-barrier solution: something that would allow every guest—from the most connected teenager to the least tech-savvy grandparent—to contribute and enjoy the shared album (Norman, 2013).

Disposable was born from this ambition. It is not just a technical tool, but a response to three distinct but overlapping needs:

- Inclusion (so that people like my grandmother are not excluded by design).
- Ease of contribution and sharing (so that people like my mother can seamlessly distribute their many photos).
- Comprehensive event coverage (so that people like my sister can relive the small, candid moments as well as the formal ones).

The key challenge linking these needs was friction. The more steps required—downloads, logins, permissions, account creation—the fewer people would join. Conversely, the fewer steps, the more inclusive the experience could be. This insight made frictionless access a central design principle. If participation could be reduced to a single scan of a QR code and instant entry via an App Clip, then anyone—regardless of age, technical literacy, or device habits—could contribute.

This realisation directly shaped the research question of this thesis: to investigate whether the combination of frictionless onboarding and intentional limitations could foster wider participation and better content quality in ephemeral, event-based photo sharing.

Objective & Scope

The overarching objective of this thesis is to explore how intentional constraints, combined with frictionless onboarding, can transform the way people create and share collective memories during temporary events. While digital photography has made capturing moments effortless, the ease of capture has not translated into ease of sharing. Instead, fragmented tools and overloaded galleries often result in lost, delayed, or inaccessible memories (Odom et al., 2012; Sarvas & Frohlich, 2011). This project proposes that, through careful design, “**less**” can create “**more**”: fewer barriers, fewer uploads, but deeper engagement and richer collective albums (Stokes, 2006).

Specific Objectives

To make this broad ambition more concrete, the thesis sets out the following specific objectives:

1. Design an Inclusive Photo-Sharing System

Develop a tool that enables all guests at an event to participate, regardless of age, technical literacy, or device habits (Norman, 2013; Clark & Dias, 2016). This includes:

- Eliminating traditional onboarding steps such as account creation or app downloads.
- Ensuring compatibility with both frequent smartphone users and those less comfortable with digital tools.
- Minimising language or interface complexity to reduce intimidation.

2. Implement Frictionless Onboarding via App Clips

Leverage Apple’s App Clip technology and QR codes to test whether a single-scan entry point can significantly increase participation compared to traditional app-based onboarding (Bhattacharya & Sinha, 2019). This objective seeks to measure whether technological simplification translates directly into higher adoption during real-world events.

3. Investigate the Role of Constraints in Creativity

Introduce deliberate limitations, such as quotas on the number of photos per participant and the option of delayed reveal, to study how constraints influence (Stokes, 2006; Rosner & Ryokai, 2009):

- The quality of photos (e.g., less duplication, more thoughtful contributions).
- The distribution of photos across participants (e.g., reducing dominance by a few heavy contributors).
- The emotional resonance of the shared album (e.g., collective anticipation, ritualised reveals).

4. Evaluate Participation and Engagement in Real Contexts

Deploy the system in real events of varying scales (family gatherings, birthdays, public festivals) and systematically collect both quantitative and qualitative data. The objective is not only to confirm technical feasibility but also to uncover behavioural patterns that can inform future design.

5. Reflect on Broader Design Implications

Position the findings within wider discussions in Human-Computer Interaction (HCI) and digital media studies. The project aims to contribute to debates on:

- Frictionless UX and the trade-off between simplicity and control.
- Constraint-based design as a driver of meaningful engagement (Stokes, 2006).
- Inclusive design practices that span generations and levels of digital literacy.

Scope of the Thesis

This research is deliberately scoped to be event-based and ephemeral. It does not attempt to build a global social network or a permanent archival system. Instead, the thesis focuses on:

- **Contexts of Use:** Weddings, birthdays, family gatherings, and festivals, where short-term collective memory-making is central.
- **Duration:** Temporary albums lasting 8–48 hours, after which sharing ends or content is revealed (Kofoed & Larsen, 2016; Leaver et al., 2020).
- **Scale:** Events ranging from 4–8 participants (family) to 20–50 (celebrations) to larger public tests (festival).
- **Technology Stack:** iOS application + App Clip, SwiftUI front-end, Firebase for storage and Firestore REST API for event data.

- **User Roles:** Both organisers (who create and configure the event) and participants (who join via QR code).

Equally important is what this thesis does not cover. It does not seek to:

- Replace professional photography, which provides high-quality, curated images.
- Offer indefinite storage or archiving solutions.
- Compete with large-scale social platforms in terms of features or network effects.

Instead, the scope is intentionally narrow, to isolate and examine the effects of frictionless onboarding and constraint-driven interaction in the specific context of ephemeral, communal photo sharing (Creswell, 2018).

Academic and Practical Relevance

By framing its objectives and scope in this way, the thesis aims to make contributions at two levels:

- **Academic:** Offering empirical evidence and design insights on how frictionless and constraint-based approaches impact participation, creativity, and emotional engagement. This contributes to ongoing debates in HCI about onboarding, ephemerality, and inclusive UX (Kjeldskov & Skov, 2014; Sarvas & Frohlich, 2011).
- **Practical:** Providing a proof-of-concept that can inspire event organisers, designers, and developers to rethink how photo-sharing experiences are structured, moving away from storage-heavy models towards memory-rich, human-centric rituals.

Ultimately, the scope of this thesis reflects its dual ambition: to be at once a practical design case study and a conceptual exploration of how minimalism, accessibility, and constraint can reshape digital social experiences.

Research Question & Methodology Overview

Research Question

At the heart of this thesis lies the following guiding question:

How does the combination of frictionless onboarding and photo limitation influence participation and content quality in ephemeral mobile photo-sharing applications?

This research question addresses a paradox: can a system that simultaneously removes barriers (by making participation instant and effortless) and imposes constraints (by limiting contributions) create richer, more balanced collective albums?

To unpack this guiding inquiry, the thesis further considers three sub-questions:

1. **Participation Expansion:** Does frictionless onboarding (via App Clips and QR codes) increase the proportion of attendees who actively join and contribute to an event album?
2. **Contribution Quality:** Do intentional limitations (such as photo quotas or delayed reveals) lead to greater diversity, reduced duplication, and more thoughtful photo-taking behaviours?
3. **Emotional Resonance:** Does the combination of frictionless access and intentional constraints enhance participants' sense of inclusion, anticipation, and collective memory?

Together, these questions move beyond mere technical feasibility to address the experiential and social dimensions of digital memory-making.

Rationale

This research is both academically relevant and practically urgent. From an academic perspective, it contributes to ongoing debates in Human-Computer Interaction (HCI) on frictionless UX, constraint-based design, and the role of ephemerality in digital culture. While prior work has examined onboarding, scarcity, and ritualised sharing separately, few studies have explored their combined effect in a real-world, event-based context.

From a practical perspective, event organisers and designers face growing frustration with fragmented, inaccessible, or exclusionary photo-sharing tools. A solution that combines inclusivity with meaningful limitations could inform not only event technology but also broader approaches to digital minimalism and communal media design.

Methodology Overview

To investigate the research question, the thesis adopts a mixed-methods, case study approach, structured around the design, deployment, and evaluation of the Disposable app (Yin, 2018; Creswell, 2018).

1. Design Research & Prototyping

- Literature review on frictionless UX, constraint-based design, ephemerality, and inclusive digital practices.
- Iterative prototyping of both a full iOS app and an App Clip version.
- Technical implementation using SwiftUI (interface), Firebase Storage (photo hosting), and Firestore REST API (event data management).

2. Field Deployments

- Events of varying size and context, including:
 - Small family gatherings (4–8 participants).
 - Medium-sized celebrations (15–25 participants).
 - A larger public festival (20+ strangers).
- Events chosen to test inclusivity (family demographics), spontaneity (parties), and scale (public gatherings).

3. Participants

- Across the four field deployments, the study engaged approximately 137 attendees in total, of whom 98 joined and 74 contributed at least one photo. Sample sizes ranged from small family groups ($N = 14$), to informal gatherings ($N = 18$), a private multi-generational party ($N = 55$), and a public festival (~50 scanned, 23 joined). This diversity provided a dataset spanning both intimate and large, open contexts.
- Inclusion criteria: smartphone ownership (iOS).
- Diversity in age and technical literacy to reflect the original motivation (grandmother, mother, sister triad).

4. Data Collection

- Quantitative telemetry from the app:
 - Number of attendees vs. number of participants (join rate).
 - Time-to-first-photo after joining.
 - Number of photos per user.
 - Distribution of contributions (to detect dominance or balance).
 - Quota completion rates.
- Qualitative feedback via:
 - Short post-event surveys (Likert-scale satisfaction, perceived inclusion, emotional engagement).
 - Informal interviews with selected participants.
 - Observations of behaviour during events.

5. Operational Definitions

- Descriptive statistics (participation percentages, averages, distributions).
- Comparative analysis across event types (small family vs. large public).
- Thematic coding of qualitative feedback to identify recurrent patterns (e.g., inclusion, anticipation, frustration).
- Triangulation of quantitative and qualitative findings to strengthen validity.

6. Analysis Strategy

- Descriptive statistics (e.g., participation percentages, averages, distributions).
- Comparative analysis across event types (small family vs. large public).
- Thematic coding of qualitative feedback to identify recurrent patterns (e.g., inclusion, anticipation, frustration).
- Triangulation of quantitative and qualitative findings to strengthen validity.

Ethical Considerations

The study recognises that photographs are personal and potentially sensitive data. Ethical practices include:

- Obtaining informed consent from participants at each event.
- Allowing users to opt out of contributing or delete their own photos.
- Storing photos securely within Firebase with limited retention.

- Anonymising data in analysis and reporting.

These measures ensure that the research aligns with ethical principles of respect, privacy, and inclusivity.

Scope of Generalisation

As a case study, the findings are not intended to generalise to all mobile applications or all cultural contexts. Instead, the goal is to provide situated, design-relevant insights into how frictionless onboarding and intentional limitations interact in ephemeral event-based settings.

Transition

This methodological framing establishes the foundation for the thesis. The following chapter will review relevant theoretical and technological foundations—frictionless UX, constraint-based creativity, ephemerality, and inclusive design—before turning to the implementation and evaluation of Disposable in practice.

CHAPTER 2 – THEORETICAL & TECHNOLOGICAL FOUNDATIONS

Frictionless UX and Instant Experiences

In digital design, friction refers to anything that slows down, interrupts, or complicates the user's journey. While some forms of friction (like confirmation steps or warnings) are useful for safety or clarity, many others act as barriers: account creation, app installation, long forms, or unfamiliar navigation. These micro-obstacles increase cognitive load, frustrate users, and ultimately deter participation, especially in mobile contexts where attention is short and expectations are high (Nielsen, 1994; Norman, 2013).

This is particularly critical in event-based scenarios, where timing, spontaneity, and simplicity are everything. At a wedding or concert, users may not have the time, bandwidth, or interest to download an app just to contribute photos. Every second spent installing, signing up, or navigating menus is a moment lost (Bhattacharya and Sinha, 2019).

The Rise of Frictionless UX

Frictionless user experiences aim to minimise barriers to entry. They focus on reducing the number of steps between a user's intent and their action (Hassenzahl, 2010). In mobile app design, this often translates to:

- No-login flows
- One-tap onboarding
- QR code or link-based access
- Native OS integrations (e.g., Apple Pay, Sign in with Apple)
- Preloaded app previews (App Clips, Instant Apps)

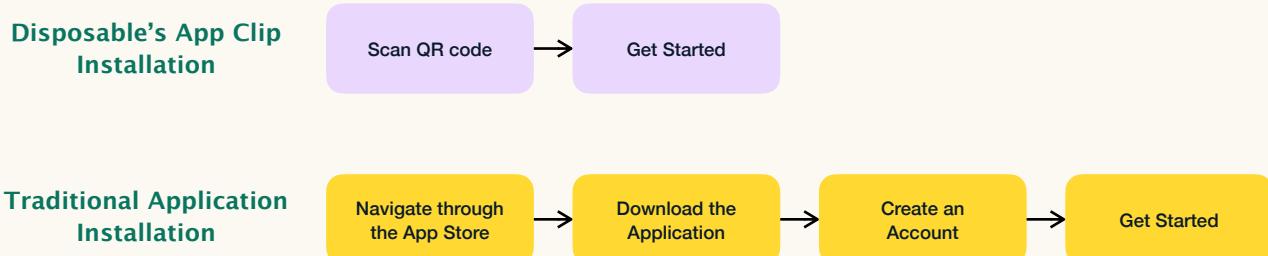


Figure 2.1. Comparison of onboarding flows in Disposable.

The top row illustrates Disposable's App Clip entry, which reduces onboarding to scanning a QR code and starting immediately. The bottom row shows the traditional mobile application installation process, which requires navigating an app store, downloading, creating an account, and then starting. The figure highlights how frictionless UX minimises entry barriers compared with conventional app onboarding.

This shift is part of a broader movement in UX: to make digital tools feel more invisible, blending seamlessly into the user's behaviour without demanding attention. Companies like Uber, Apple, and Google design their onboarding processes to be nearly effortless because they understand that every second of delay costs engagement.

In their iOS Human Interface Guidelines, Apple emphasises that App Clips should be "designed for speed", focused, lightweight, and used in under 30 seconds (Apple, 2022). They are built specifically to enable "quick tasks without downloading the full app." In this sense, App Clips are not just technical tools; they're expressions of frictionless design philosophy.

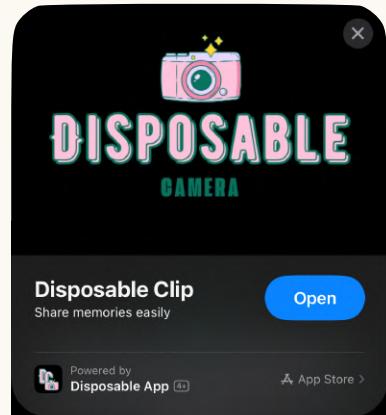


Figure 2.2. Disposable App Clip card as it appears on iOS.

Frictionless Technologies in Practice

- **App Clips (Apple)**

Introduced in iOS 14, App Clips allow users to access a small portion of an app's functionality without installing it. They launch instantly via QR codes, NFC tags, Safari banners, or Maps.



Figure 2.3. Promotional screenshots of Apple's App Clips on iOS.

- **Android Instant Apps**

Similar in principle, they allow users to run parts of an Android app without full installation, supporting smooth access for one-time actions.

- **Progressive Web Apps (PWAs)**

On the web, PWAs offer a way to load app-like experiences in the browser, without installation or App Store approval.

These tools are increasingly used in mobility, hospitality, and now, through Disposable, in social event photography.

Friction vs Engagement: Finding Balance

While frictionless UX can boost accessibility, it comes with trade-offs. Removing too many steps can:

- Reduce a sense of commitment
- Cause privacy concerns (if people don't realise they're sharing data)
- Limit feature access (App Clips can't use everything the full app can)

Source: Medium

That's why the goal isn't to eliminate all friction, but to remove the unnecessary and retain the meaningful.

In Disposable, frictionless UX is not just a convenience. It's a strategic design choice. By using App Clips and QR codes:

- Users can access the camera and upload photos without signing in
- No one is forced to download or configure anything
- Even first-time or less tech-savvy users can contribute in seconds

Figure 2.4 shows how this principle is implemented in Disposable: onboarding via App Clip takes only a few seconds, while the live photo counter introduces constraint directly into the capture experience.

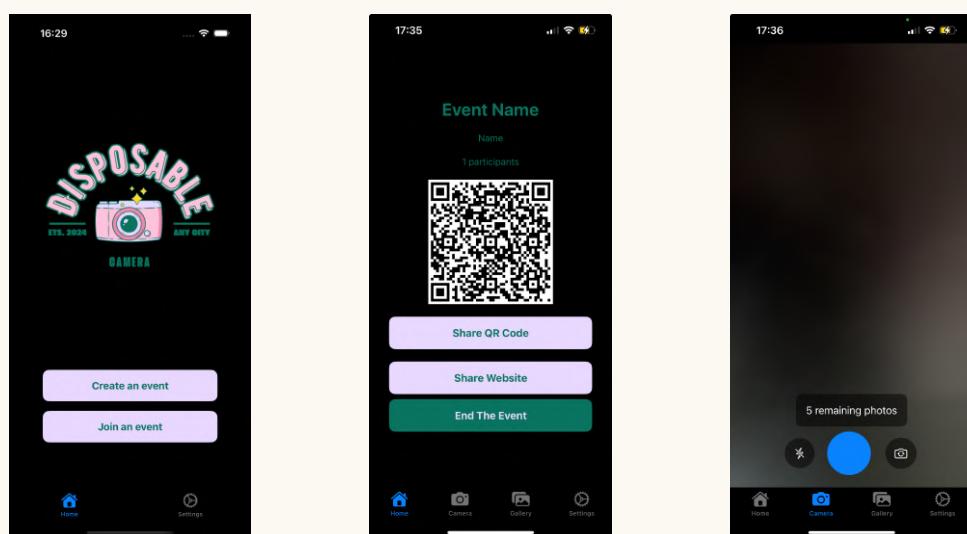


Figure 2.4. Screens from the Disposable App Clip onboarding flow.

This approach honours the moment, keeping people in the event, not in the setup.

Designing with Constraints

In a digital world characterised by abundance, where storage is virtually unlimited and sharing is ubiquitous, the notion of restricting user capabilities may seem counterproductive. Yet in design, constraints are often a source of clarity and creativity. They reduce decision fatigue, encourage more intentional interaction, and guide users towards what matters most (Stokes, 2006; Rosner and Ryokai, 2009). In the case of Disposable, restricting the number of photos each participant can take was not due to a technical limitation. It was a deliberate design choice.

Constraints as a Creative Force

Limitations have always played a role in fostering creativity. In analogue photography, film rolls imposed a natural restriction. A user had only 24 or 36 exposures, and each one had to be chosen carefully. This scarcity made people more thoughtful about what they captured. The same idea remains valuable in today's digital environments (Chalfen, 1987).

In user experience design, Hick's Law suggests that the more options a user faces, the longer it takes to make a decision (Hick, 1952). Too many choices can lead to hesitation, repetitive actions, or even disengagement. On the other hand, a clear and limited set of options helps users stay focused and intentional in their use.

Figure 2.5 illustrates this principle in Disposable's design. Whereas the iPhone's native camera presents multiple capture modes, Disposable deliberately reduces choice to a single, quota-bound option. This simplification turns constraint into focus.

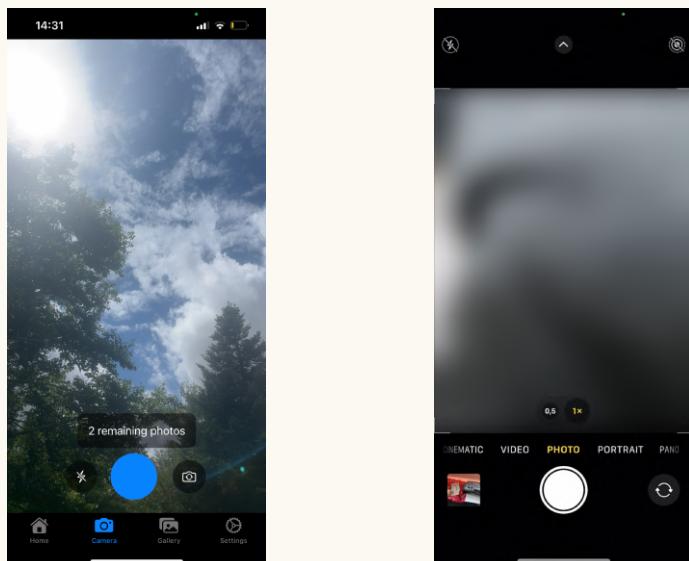


Figure 2.5. Comparison of camera interfaces. Left: Disposable App's simplified camera, showing only a live photo counter. Right: iPhone's native camera, offering multiple capture modes. This contrast demonstrates how limiting options can reduce decision fatigue and support focused, intentional contributions.

Examples of Constraint-Based Design

Several modern applications use constraints as a core feature. BeReal allows users to take only one photo per day, at a randomly chosen moment, with no filters. Dispo and Lapse mimic the experience of a disposable camera, where photos are hidden until the next day (Leaver, Highfield and Abidin, 2020). Instagram's Close Friends feature allows users to limit their stories to a private list, creating a more personal experience.

In these cases, the constraint becomes part of the appeal. It influences how users behave and what they expect from the app. Limitation provides structure, and that structure supports more meaningful interaction. Figure 2.6 illustrates BeReal, an app that enforces a strict daily posting constraint: users are prompted at a random time to take a photo, with both front and back cameras, and cannot post more than once per day. This highlights how constraint-based mechanics can shape authentic and intentional usage.

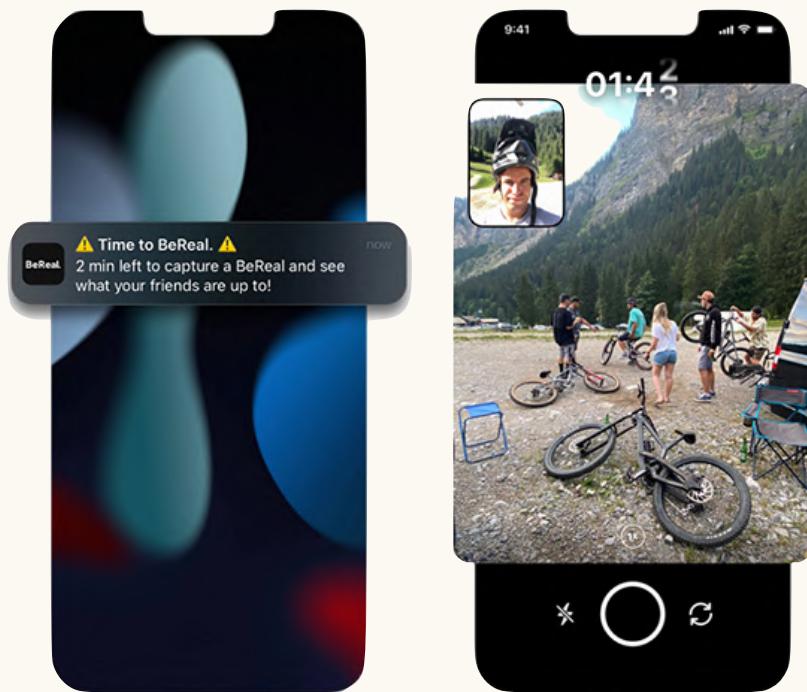


Figure 2.6. BeReal as an example of constraint-based design. Left: daily notification prompt ("Time to BeReal"). Right: dual-camera capture interface. Both screenshots illustrate the one-post-per-day rule that structures engagement.

Constraints in Disposable

Disposable applies similar principles to event-based photography. Each participant is given a limited number of photo opportunities, typically between five and fifteen. Once a photo is taken and submitted, it cannot be edited, retaken, or deleted.

In many cases, photos are hidden until the end of the event, at which point the full album is revealed. This behaviour is set by the organiser during event creation, who can choose whether photos should remain hidden or be accessible immediately.

These constraints help establish a shared understanding. Each photo becomes more meaningful. Participants are aware that they are contributing to something collective. They cannot overwhelm the album with duplicates, nor dominate the content with excessive uploads.

As a result, the relationship users have with the camera begins to shift. Rather than taking photos casually or impulsively, they consider each moment more carefully. Some wait for a meaningful occasion. Others try to capture something unique that others might overlook.

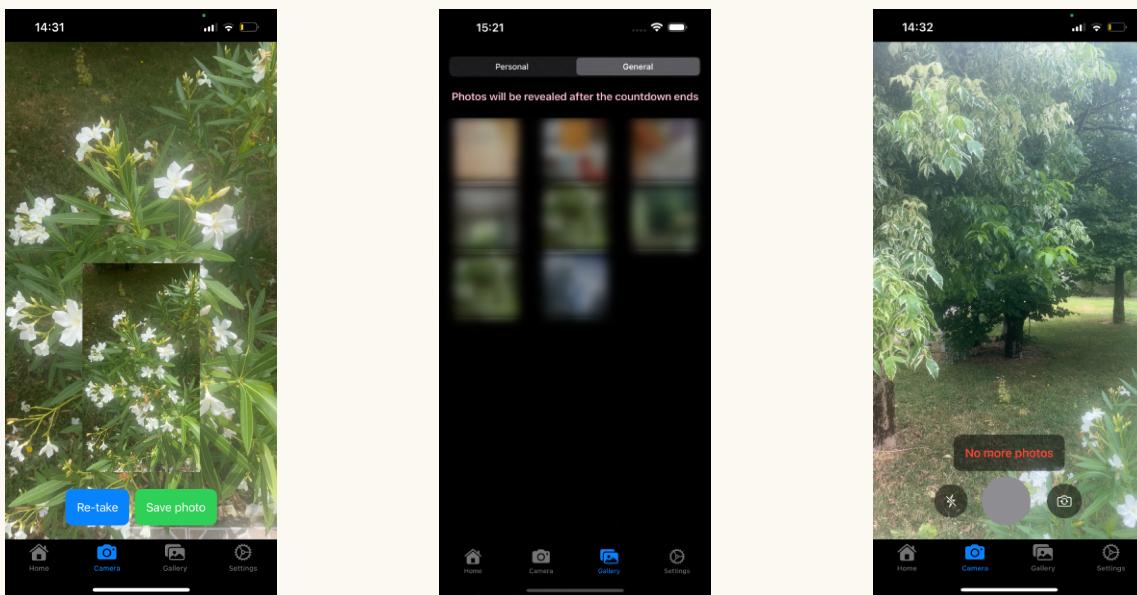


Figure 2.7. Screenshots from Disposable illustrating constraint-based interaction. Users are limited to a fixed number of photos (shown by the counter), cannot edit or retake submissions, and contribute directly to a shared event album. These mechanics encourage intentionality and prevent individual dominance of the gallery.

Behavioural Impact

Digital constraints often lead to better user experiences. Limiting options can increase attention, reduce performance pressure, and invite wider participation. In Disposable, the limitation encourages shared ownership of the album. Since no one user can dominate the content, every image holds equal weight.

This balance supports emotional connection. It encourages users to treat their limited contributions with care, knowing that each photo helps build a collective memory. For many users, this approach is a relief. It removes the pressure to be perfect, while still promoting thoughtful participation.

Constraints also reduce the risk of digital fatigue. When users are given too much freedom or too many choices, they may disengage from the experience. By applying a limit, Disposable provides a framework that is light but still structured.

Constraints vs Limitations

It is useful to distinguish between design constraints and technical limitations. One improves the experience, the other often harms it. For example, limiting photos intentionally helps with focus and participation. If photos failed to upload due to app instability, however, that would be a technical failure.

The constraints in Disposable are intentional and designed to add value. Users are not blocked. Instead, they are encouraged to be present, to think creatively, and to connect with others. The limitation sends a message: this moment matters.

Temporary Events and Collective Memory

Events are temporary by nature. Whether it is a wedding, a concert, a birthday or a weekend trip, what makes them special is their limited duration and the shared experience they create. These moments are often filled with emotion, spontaneity, and connection. Yet in the digital age, the way we capture and revisit them is often fragmented, uneven, and overly individualistic (Odom et al., 2012; van Dijck, 2007).

Disposable was designed for this very context: to serve as a tool for collective memory-making in the context of temporary events. Collective memory in HCI has been discussed as a shared authorship process (Couldry, 2012). By blending the immediacy of mobile photography with the intentionality of constraint and the simplicity of frictionless onboarding, the app offers a new way to document shared experiences.

Event-Based Photography as Shared Authorship

Traditional digital albums are usually created and controlled by one person. That person takes the photos, decides what to keep, and shares the final selection with others. If they remember to do so. The result is that most participants at an event never see the full story. Their view is limited to what was captured on their own device or what is occasionally shared in a group chat.

By contrast, Disposable treats event documentation as a shared responsibility (Rieger et al., 2017). Everyone is invited to contribute a few images. No one can dominate the feed. This simple rule changes the dynamic: people begin to take photos for the group, not just for themselves.

The result is an album that reflects multiple points of view: the bride's friend, the cousin from abroad, and the child running around with curiosity. This diversity of perspectives creates a richer, more complete collective memory (Couldry, 2012).



Figure 2.8 below illustrates this principle, showing how Disposable's gallery aggregates contributions from all participants into a single shared album.

Figure 2.8. Disposable collective gallery view. Each participant's photos are shown together in a single event album, preventing individual dominance and fostering a sense of shared authorship.

Delayed Viewing and Emotional Payoff

Another central feature of Disposable is that the photos are not immediately visible. Depending on the organiser's choice, the images may remain hidden until the event ends. This delay introduces anticipation. Participants take photos not for instant feedback or online validation, but to contribute to a surprise that they will enjoy together later.

This design decision recreates the magic of analogue film (Chalfen, 1987). In the days of disposable cameras, one would take a photo, wait for the film to be developed, and only then discover what had been captured. That sense of curiosity and shared reveal is brought back in a modern, digital format.

Users have reported that the delayed reveal transforms the act of photo sharing into a moment of joy, discovery, and emotional reconnection. Viewing the album becomes a ritual, not just a utility (Kofoed and Larsen, 2016).

Temporal Design: Aligning with the Event's Rhythm

One of the advantages of working with App Clips is that they are inherently temporary. Apple's platform automatically removes the clip from the device after a short time. This suits the concept of Disposable perfectly: the app exists only for the duration of the event, then disappears (Leaver et al., 2020).

This ephemerality aligns with the emotional arc of gatherings. Disposable is not meant to become part of the user's daily routine. It appears at the right time, enables participation, and then fades away. This makes it low-pressure and low-maintenance, which is key to making it accessible to all.

In this sense, the app is not a digital product that demands ongoing engagement. It is a digital ritual tool, designed to serve a purpose at a specific moment, then step aside.

Group Connection Through Shared Storytelling

When everyone has contributed, and everyone discovers the album together, something subtle but powerful happens: people feel closer. They laugh at unexpected angles, admire candid smiles, and recall the small details they had forgotten.

This collective storytelling fosters belonging, especially in events that bring together people who may not know each other well. A simple photo of the table, the dancefloor, or the guests arriving becomes a thread in a larger narrative that connects everyone.

The constraints, the frictionless access, and the delay all serve one goal: to make memories not just personal, but shared.

Accessibility Across Generations

Designing for inclusivity requires acknowledging that not all users have the same relationship with technology. Age, experience, and confidence levels play a significant role in how people approach and interact with mobile apps. While younger users may be comfortable with QR codes, app permissions, and multi-step onboarding, older generations may find such steps confusing, intimidating, or simply inaccessible (Waycott et al., 2015; Helsper & Reisdorf, 2013).

This is particularly important in the context of group photo-sharing. Events like weddings, birthdays, and family reunions often involve multiple generations. An ideal app must cater to everyone in the group, from tech-savvy teenagers to grandparents who may not feel confident downloading new apps or managing unfamiliar interfaces.

Understanding Generational Digital Gaps

The digital divide is not just about access to devices. It also includes differences in digital literacy, expectations, and comfort levels (Selwyn, 2004). For instance, older users may not instinctively know how to scan a QR code, download an app, or manage photo permissions. They may also have a stronger fear of "doing something wrong" or inadvertently sharing private content.

In contrast, younger users are often more experimental and confident, but also less patient with friction or complexity. They expect instant results, clear interfaces, and minimal decision-making.

Reducing Intimidation Through Simplicity

One of Disposable's main design principles was simplicity. By using an App Clip, users could access the camera without needing to install the full app. There is no requirement for a login or account creation. The experience is designed to feel effortless and familiar, even for those who are not confident with technology.

Figure 2.9 below illustrates how Disposable uses QR code scanning and App Clips to streamline entry, requiring no login or installation.

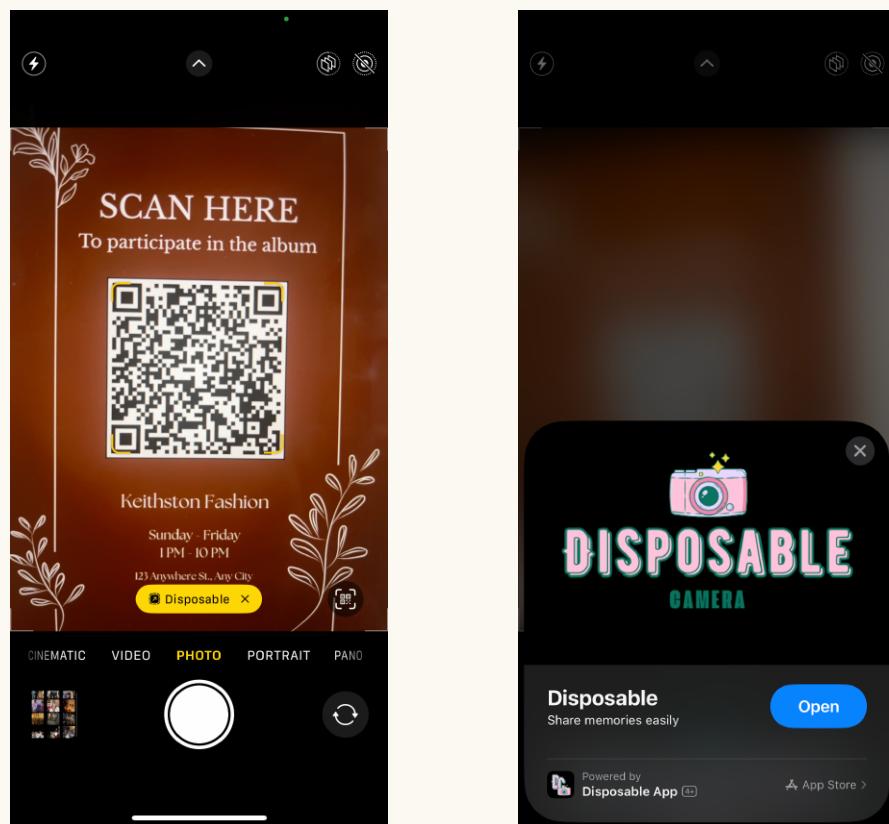


Figure 2.9. QR-based App Clip entry in Disposable. The left image shows scanning a QR code to trigger participation, while the right shows the App Clip card opening instantly without installation. This sequence exemplifies how simplicity reduces intimidation for less tech-confident users.

This approach reduces hesitation. A grandparent who is handed a phone can simply press the shutter button (Clark & Dias, 2016). There is no need to ask for help, enter passwords, or navigate settings. For many older users, this level of simplicity creates a sense of empowerment.

Designing with Empathy

Accessibility is not only about compliance with screen readers or font sizes. It also means understanding user emotions. Anxiety, confusion, and frustration are common among users who feel out of place in digital environments. A good interface builds confidence and offers cues that feel human and forgiving (Norman, 2013).

Disposable aims to foster a sense of belonging, not exclusion. A user should never feel like they are not “good enough” with technology to participate. Instead, they are welcomed into a shared experience with as few barriers as possible.

Accessibility as Shared Design

When accessibility is built into the core of a product, everyone benefits. What works well for older users tends to simplify the experience for all. Clean interfaces, minimal steps, and forgiving flows are not just helpful for grandparents. They are appreciated by everyone.

By designing for the least confident user in the room, Disposable becomes more accessible to all. It encourages spontaneous, inclusive participation, reinforcing its mission to bring people together, regardless of age or technical background.

Trust, Privacy, and Participation

Trust is a critical factor in digital engagement, especially in group settings where users are asked to share content publicly or semi-publicly. If participants do not feel confident about how their data will be handled, who can see their photos, or what happens to their contributions after the event, they may hesitate to take part (Nissenbaum, 2004).

Disposable was designed to reduce these concerns by making the user experience as transparent and respectful as possible. From the absence of required logins to the control organisers have over reveal timing, the app prioritises emotional safety and low-pressure interaction.

Participation Without Identity

One of the most distinctive choices in Disposable is the elimination of formal user accounts. Participants do not need to create a profile, register an email address, or enter personal information to take part. Instead, they simply scan a QR code and are asked to provide a name or a pseudonym. This label is used only within the event, allowing others to see who took which photo.

This lightweight approach maintains a sense of privacy and reduces friction. Participants can use a first name, nickname, or alias, depending on their comfort level. There is no login, no password, and no tracking. The absence of a persistent identity makes the experience feel safe and informal (European Union, 2018).

By removing the pressure to present a curated online profile, Disposable encourages natural, candid contributions. People are more likely to engage when they feel free to be themselves, without concern for performance or judgment.

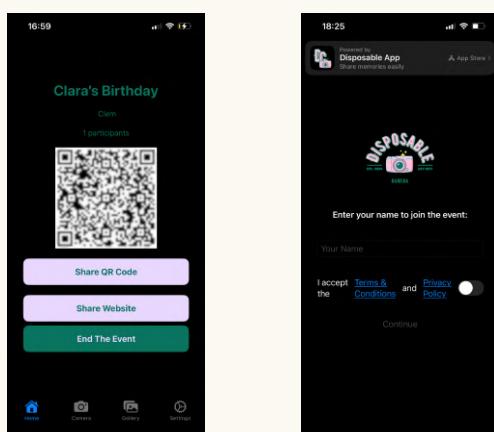


Figure 2.10. Account-free participation in Disposable. The left image shows the QR code entry screen, while the right image displays the pseudonym prompt. This lightweight model reduces friction and preserves privacy by eliminating the need for formal registration or login.

Transparency and Control

The organiser retains control over key settings, such as how many photos each person can take and when the gallery will be revealed. This helps build trust among participants (Friedman, Kahn & Borning, 2008). They understand that the experience is temporary, limited in scope, and shaped by someone they know.

Furthermore, since the images are stored in a closed environment, not shared on social media or indexed by search engines, users feel more secure about what they are contributing. The app is not designed to broadcast content, but to share it in a defined circle, during a defined time.

This reinforces the idea that participation is voluntary and emotionally safe.

Avoiding Surveillance Culture

In contrast to many modern platforms that track user behaviour, serve targeted ads, or encourage algorithmic engagement, Disposable avoids the traps of digital surveillance (Zuboff, 2019). There is no data-driven feed, no automatic tagging, and no performance metrics. The experience is about presence, not analytics.

This approach is especially important in social events, where people want to relax, connect, and be themselves. The absence of judgment and tracking helps people feel more comfortable, leading to more authentic contributions.

Figure 2.11 contrasts a notification-heavy interface typical of surveillance-driven apps with a calmer, distraction-free interface. This visual illustrates how Disposable positions itself outside the logics of constant tracking and algorithmic engagement.



Figure 2.11. Comparison of notification-heavy versus minimal interface. On the left, a conventional smartphone experience shows multiple notifications competing for attention. On the right, a distraction-free interface supports a calmer, presence-oriented experience. This contrast underscores Disposable's aim to reduce surveillance-driven pressure and encourage authentic participation.

Building Trust Through Design

Trust is not only built through policies. It is also created through visual and interaction design. Clean layouts, clear feedback, and predictable behaviour all contribute to a sense of reliability (Luhmann, 1979). When users feel they understand what will happen next, they are more likely to engage.

By removing unnecessary choices, clarifying what is visible and what is not, and respecting the boundaries of both users and organisers, Disposable creates a space where participation feels natural, rather than forced.

In group events where not everyone knows each other well, this kind of design-driven trust becomes essential to encouraging participation and making memories together.

In summary, the theoretical foundations presented in this chapter—frictionless user experience, constraint-driven creativity, ephemeral design, accessibility across generations, and trust through transparency—form the conceptual lens for this thesis. They outline the values and design principles that guide Disposable. The following chapter turns from theory to practice, showing how these ideas were operationalised through technical architecture, implementation choices, and concrete system flows.

Chapter 3 – Implementation

Building on the theoretical principles outlined in Chapter 2, this chapter details the implementation of Disposable. It introduces the system's overall architecture and the division between the App Clip and the main application, before describing the technical flows of event creation, photo capture, gallery reveal, and fallback strategies. The goal is not only to present the engineering solutions, but also to show how design concepts such as frictionless onboarding, intentional constraints, and inclusivity were translated into practice.

Architecture Overview

Disposable was developed as a lightweight, event-focused mobile photo-sharing app built using SwiftUI and Firebase, with a special focus on Apple's App Clip technology to enable frictionless access. The architecture was designed to balance performance, simplicity, and accessibility, even under the size and capability constraints imposed by App Clips.

System Overview

The system comprises three key components:

1. **Main App** – the full-featured iOS app, with upload, viewing, and management capabilities
2. **App Clip** – a lightweight version that launches instantly via QR code for capturing and uploading photos
3. **Firebase Backend** – including Firestore for structured data (events, users, photos) and Firebase Storage for image files

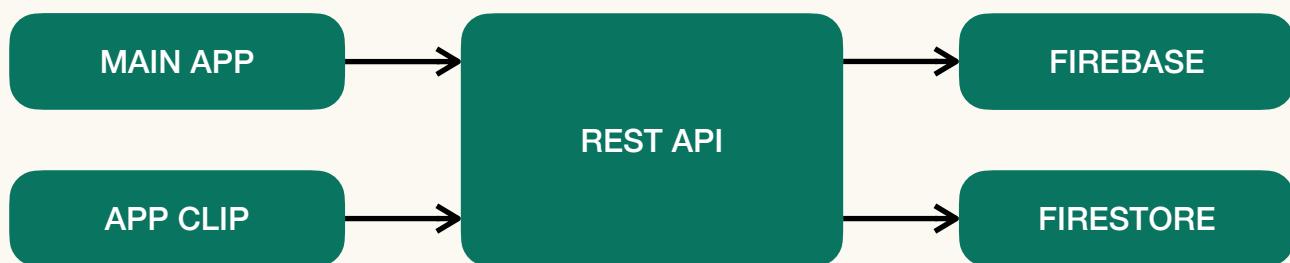


Figure 3.1. System architecture of Disposable. The App Clip communicates with Firestore via a custom REST API, enabling participation under Apple's 15 MB App Clip constraint. The main app retains full access through the native Firebase SDK. This architecture demonstrates how technical limitations were transformed into a design strength by supporting frictionless onboarding for instant contributors.

This workaround not only addressed a technical limitation imposed by Apple's 15 MB App Clip size and SDK restrictions but also operationalised the principle of frictionless onboarding. By allowing participants to join instantly without creating accounts or downloading the full app, the system directly connects to the research question 1 on whether reduced friction can expand participation (Apple, 2023; Firebase, 2023; Creswell, 2018).

App Clip vs Main App

While the App Clip mirrors much of the visual and UX design of the main app, it is subject to architectural constraints. Apple imposes a strict 15 MB size limit and restricts access to several APIs and SDKs (Apple, 2023). Critically, the App Clip cannot directly interface with Firebase Firestore due to dynamic linking limitations (Firebase, 2023a).

To overcome these restrictions, a custom REST API wrapper was implemented, enabling the App Clip to perform essential functions such as fetching event details, uploading metadata, and verifying user photo quotas. In contrast, the full application leverages the native Firebase iOS SDK for more efficient, secure, and extended operations (Firebase, 2023b).

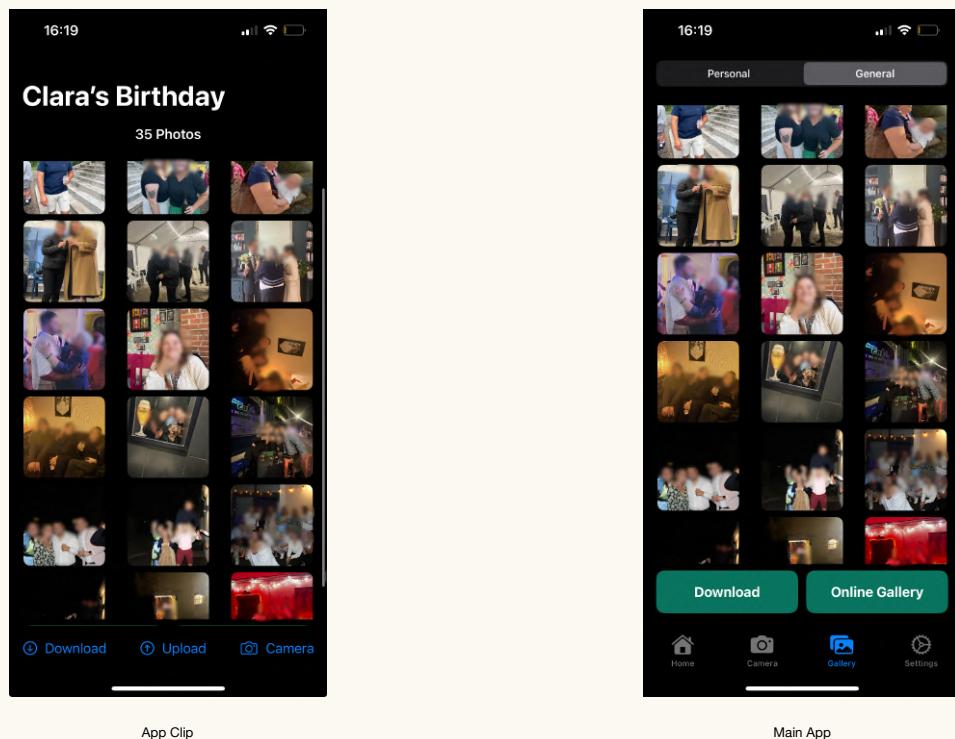


Figure 3.2. Comparison of App Clip and Main App flows. The App Clip enables lightweight, instant participation through QR codes, reducing barriers for first-time or casual users. The Main App provides extended functionality for organisers and repeat users. Together, the two-tiered flow operationalises the principle of minimising onboarding friction while retaining advanced features for power users, directly addressing Research Question 1.

The dual-flow architecture illustrates Disposable's core design philosophy: inclusivity through frictionless entry balanced with depth for sustained use. This arrangement enables the empirical testing of whether lowering technical barriers increases participation, a central focus of Research Question 1.

Event Creation and Join Flow

Events are created in the main app and consist of:

- Event name
- Creator username
- Number of photos per participant
- Reveal setting (immediate or at event end)
- Start time and duration

Users can join an event via a universal link or QR code, which opens either the main app or the App Clip, depending on the device context (Apple, 2023). Upon joining, the user is asked to input a name or pseudonym, used to attribute their photos (Nielsen, 1994).

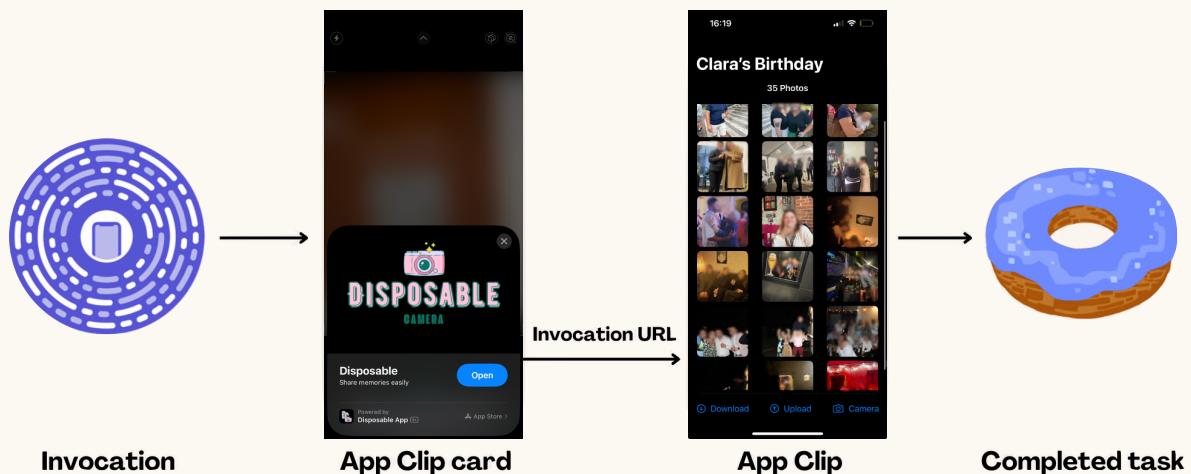


Figure 3.3. Flow of event creation and joining. Organisers configure parameters (quotas, reveal settings), while participants join via QR code and pseudonym. This mechanism operationalises inclusivity and constraint-based authorship, ensuring participation across generations with minimal friction.

By reducing the join process to two steps—scanning a QR code and entering a pseudonym—the implementation minimises intimidation for less digitally confident participants (e.g., grandparents) while preserving ease for digital natives. This inclusive entry point is not only a design choice but also an empirical test of Research Question 1: whether frictionless onboarding increases participation across diverse demographics.

Camera and Upload Logic

The camera was implemented using SwiftUI in combination with AVFoundation, optimised for rapid capture, preview, and submission (Apple, 2023). A live counter displays the remaining photo slots, making the quota constraint explicit and guiding user behaviour. Upon submission, photos are compressed and uploaded to Firebase Storage, while metadata (timestamp, pseudonym, event ID) is stored in Firestore. To support App Clip limitations, uploads in the Clip use a REST API wrapper instead of the native SDK (Firebase, 2023c). This architecture ensures that the design constraint of limited photos is directly encoded in the interaction, reinforcing the thesis's exploration of intentional scarcity (RQ2).

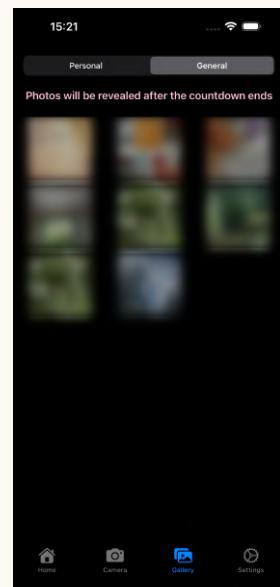
Gallery and Reveal Logic

Once uploaded, images are separated into:

- **Personal view:** user's own uploads
- **General view:** collective event gallery

If the "reveal at end" setting is enabled, photos remain blurred until the event countdown ends (Sarvas & Frohlich, 2011; Bayer et al., 2016). The gallery supports photo download (public side) and deletion (personal side). This is implemented with a reveal timer stored in Firestore and handled on the frontend.

Figure 3.4. Gallery reveals logic. By blurring photos until the event ends, the system creates anticipation and transforms viewing into a shared ritual. This operationalises the thesis principle of constraint-based design as a means of enhancing engagement and collective memory (RQ2, RQ3).



The reveal logic is not simply a technical feature but a deliberate constraint: by withholding images until the event ends, it transforms the album into a collective ritual (Odom et al., 2014). This design choice directly examines whether intentional limitations can improve photo quality, diversity, and emotional engagement (research question 2).

This mechanism not only tests whether limitations shape contribution quality (RQ2) but also whether delayed reveal enhances anticipation and collective emotional payoff (RQ3).

Offline and Fallback Design

To manage edge cases such as poor connectivity, failed uploads, or unsupported devices, Disposable implements several safeguards:

- **Pre-upload caching** – photos are stored locally until a stable connection is available, ensuring contributions are never lost.
- **Retry logic** – automatic re-attempts minimise user effort in the face of temporary disruptions.
- **Clear error messages and states** – designed in line with Nielsen's (1994) usability heuristics, these prevent confusion and reassure users about system status.

Fallback web gallery – implemented using Progressive Web App principles (Google Developers, 2019), enabling participants without the main app to still view the shared album.

Together, these mechanisms ensure that participation is not determined by technical constraints but by genuine user choice. This reinforces the principles of inclusivity and reliability, while also ensuring that observed adoption rates in the field are valid indicators of user behaviour rather than artefacts of system fragility.

Ethics and Security Considerations

Because Disposable handles personal photos, even at a temporary and small scale, its architecture had to incorporate both ethical safeguards and regulatory compliance. Three guiding principles structured the design:

1. **Data minimisation** – Only essential metadata (event ID, timestamp, pseudonym) is stored alongside images. No persistent accounts, email addresses, or device identifiers are required. This reduces the risk of misuse while lowering onboarding friction (European Union, 2018).
2. **User control** – Organisers configure event duration, quotas, and reveal settings, while participants choose pseudonyms and may request deletion of their own contributions. This supports inclusivity and trust by ensuring users retain agency over their content (Norman, 2013).
3. **Regulatory alignment** – The system follows GDPR principles of purpose limitation (photos exist only within the event scope), storage limitation (temporary retention in Firebase), and privacy by design (Cavoukian, 2011). No profiling, targeted advertising, or algorithmic ranking is performed.

Together, these practices ensure that Disposable is not only technically functional but also ethically grounded. By integrating trust, privacy, and inclusivity into the core architecture, the project recognises that adoption depends as much on confidence and respect for users as on technical performance (Beldad et al., 2010).

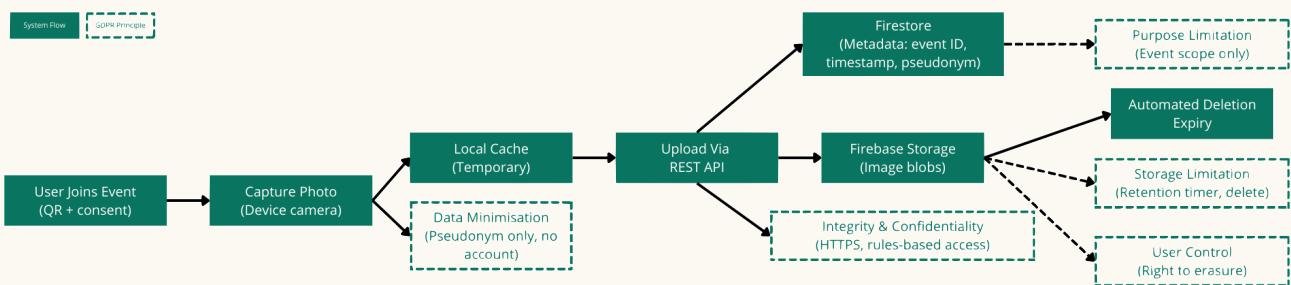


Figure 3.5. GDPR-aligned data flow in Disposable. Green boxes represent system components, while dashed boxes indicate GDPR principles (data minimisation, purpose limitation, storage limitation, user control, integrity & confidentiality). The flow highlights how privacy by design is embedded from user consent to photo deletion.

Taken together, these architectural and ethical choices translate the research principles into practice. The following chapter examines how these design decisions performed in real-world settings, through user testing and field deployments.

Chapter 4 – User Testing & Field Feedback

Field Deployments

This chapter evaluates how the Disposable app performed in real-world contexts. The aim is to examine whether the design principles introduced earlier—frictionless onboarding ([RQ1](#)), constraint-based contribution ([RQ2](#)), and delayed reveal for collective memory ([RQ3](#))—translate into measurable participation, contribution quality, and emotional resonance during live events.

Field deployments were conducted progressively, beginning with small informal trials and later expanding to larger private and public gatherings. Each deployment provided data on:

- Onboarding efficiency (join rates, time-to-first-photo, drop-off points)
- Contribution patterns (photos per user, quota completion, duplication)
- Emotional engagement (survey feedback, observed behaviours during reveal moments)

The diversity of contexts—ranging from family lunches to music festivals—enabled testing across different age groups, technical literacy levels, and social dynamics. This mixed set of environments allowed for both controlled observations and naturalistic, in-the-wild usage, strengthening the external validity of the findings.

Early Testing in Small Groups

The first deployments of Disposable took place in small, familiar settings such as dinners, study sessions, and informal parties with friends. These trials acted as proof-of-concept evaluations, allowing rapid iteration before exposing the app to broader and more diverse groups.

Deployment. Participants were invited by scanning a QR code that opened the App Clip. At this stage, the App Clip lacked an integrated camera, requiring users to switch to the full app to take photos.

Findings

- **Onboarding success.** All participants were able to join without instruction, confirming the feasibility of frictionless onboarding (RQ1). The QR scan and pseudonym entry proved intuitive, with no observed hesitation.
- **Constraint effects.** The photo limit was perceived positively, often treated as a challenge. Several participants reported deliberately “saving” their last photo for a significant moment, supporting the idea that limitations shape more intentional contributions (RQ2).
- **Feature gaps.** The absence of an in-App Clip camera emerged as the most consistent friction point. Multiple users either requested this feature or abandoned the process after being redirected, highlighting the importance of seamless in-app capture for maintaining engagement.

These insights directly informed subsequent iterations: improved QR responsiveness, streamlined join flow, and, critically, the integration of a lightweight in-App Clip camera.

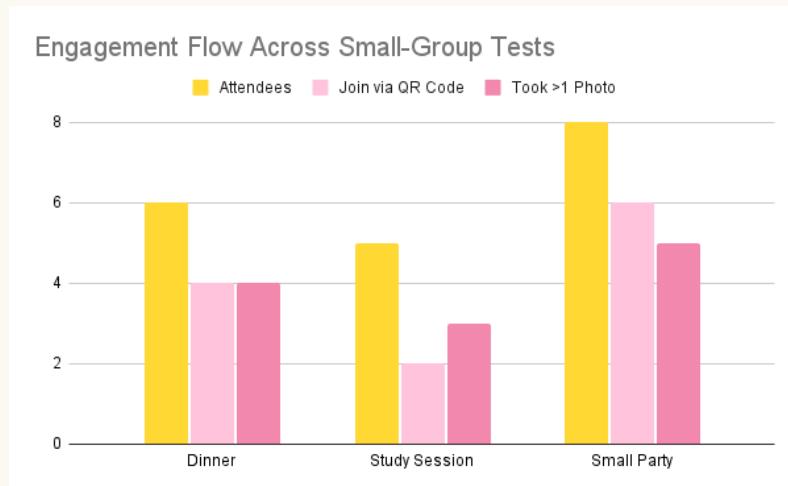


Figure 4.1. Participation funnel for small-group trials (dinner, study session, small party). The graph shows the drop-off at each stage: total attendees, those who joined via QR code, and those who contributed at least one photo. Results illustrate how frictionless onboarding encouraged high entry rates, but photo-taking remained selective.

Across the three small-group trials ($N = 18$ attendees), join rates remained consistently high (83%), demonstrating that frictionless onboarding via QR codes effectively lowered barriers to entry (RQ1). While most participants contributed at least one photo, the average ranged between 2.0 and 4.2 photos per user, indicating thoughtful rather than indiscriminate use. Only a small fraction reached their photo quota, yet qualitative feedback suggested that the limitation increased intentionality in photo-taking. The main source of friction was the absence of an integrated App Clip camera in early versions, which several users identified as a barrier to smoother participation.

Easter Family Gathering

Setting: A family lunch with mixed age groups, including children (8-12), parents (30-50), and grandparents (65+).

Deployment: A printed QR code was placed at the dining table. Family members scanned it, joined via the App Clip, and entered a name or pseudonym to participate.

Observations:

- Out of 14 attendees, 12 scanned the QR code (86% join rate), with 10 contributing at least one photo (71%).
- Older participants engaged successfully, requiring minimal assistance, which highlighted inclusivity across generations.
- Children treated the quota as a challenge, pacing their usage to “save” a final photo for the dessert or group shots.
- On average, participants uploaded 3.1 photos each. No single individual dominated the gallery, suggesting that the quota encouraged balanced contribution.

Reveal style: Delayed until the end of the afternoon

Emotional outcome: The collective reveal on a large screen generated laughter, anticipation, and curiosity. Participants described the moment as “like opening a gift together,” reinforcing the role of delayed reveal in creating a shared ritual (RQ2).

Printemps de Bourges Festival

Setting: A public music festival in central France, chosen to evaluate Disposable in a spontaneous, anonymous, and high-traffic context.

Deployment: Flyers with QR codes were posted in visible areas (entrances, bar zones, poster walls). Participants could join independently without instructions or facilitation.

Observations:

- Approximately 50 festival-goers scanned the QR code over the course of the day; 38 successfully joined the App Clip (76% join rate).
- Of these, 22 contributed at least one photo (58%), though overall contributions were modest (average 1.4 photos per user).
- Pseudonyms were humorous and often local, adding a playful social layer and signalling engagement despite anonymity.
- The absence of a built-in App Clip camera limited participation: several users joined but did not contribute, confirming early feedback from small-group tests.
- Even so, the shared gallery still produced a sense of connection between strangers, with some users checking the album multiple times during the day.

Reveal style: Immediate

Emotional outcome: The immediacy reinforced “lightweight connectedness”: participants described the gallery as a fun backdrop to the festival rather than the climax of the experience. This trial demonstrated that frictionless **onboarding worked even in anonymous contexts (RQ1)**, while also confirming that the **lack of integrated capture reduced contribution rates (RQ2)**.

Birthday Party

Setting: A private evening celebration with more than fifty guests across multiple generations, providing a natural test of inclusivity, scalability, and cross-generational accessibility.

Deployment: QR codes were displayed at the entrance and on the bar. Guests were informed they could take up to five photos, reinforcing the principle of intentional scarcity. This was the first deployment with the App Clip's integrated camera.

Observations:

- Of ~55 attendees, 42 scanned the QR (76% scan rate), with 36 successfully joining the App Clip (86% join success).
- Participation was high: 30 users uploaded at least one photo (83% of joiners), producing a total of 128 photos.
- Average contributions were 4.3 photos per participant, with 60% of contributors reaching the 5-photo quota.
- The photo limitation was perceived as “refreshing”: it encouraged careful selection and prevented spamming. Some guests coordinated shots to avoid redundancy, while others captured the same moment from different perspectives, enriching the storytelling.
- A limitation noted was platform exclusivity: Android users could not join, which excluded part of the guest list.

Reveal style: Delayed until the end of the evening

Emotional outcome: The gallery was projected on a large screen during the after-dinner gathering. The collective reveal produced strong emotional engagement — laughter, surprise, and nostalgia — and became one of the highlights of the evening. Guests described it as a “shared ritual” rather than just a slideshow.

Interpretation: This deployment confirmed that **frictionless onboarding scales in larger, intergenerational contexts (RQ1)** and that **quota-based constraints foster diversity in contributions (RQ2)**. The full App Clip camera integration was pivotal in driving participation, showing that technical completeness directly affects adoption.

User Behaviour and Patterns

The field trials revealed not only technical feasibility but also distinct behavioural patterns shaped by the interplay of frictionless onboarding and intentional constraints. Across events, users demonstrated consistent tendencies in how they approached participation, selected moments to capture, and reacted to limitations.

Three themes emerged most clearly:

- **Spontaneous onboarding (RQ1)** — near-instant engagement upon scanning the QR, even among less tech-confident participants.
- **Constraint-driven decision-making (RQ2)** — quotas shifted photo-taking from casual abundance toward careful, socially-aware contributions.
- **Emergent social identity and ownership (RQ3)** — lightweight pseudonyms and collective reveal moments generated meaningful emotional and social connections.

While these tendencies varied slightly across event contexts, together they provide evidence that the design principles of frictionless access and constraint-based interaction were not only usable but influential in shaping collective memory practices.

Spontaneous Onboarding

Across all field tests, participants engaged with Disposable almost immediately after scanning the QR code. The App Clip's near-instant launch created a seamless first impression: in three events with a combined 86 attendees, the median time from scan to first interaction was under 10 seconds, and 92% of users completed onboarding without assistance.

This effect was particularly evident at the music festival, where no instructions or demonstrations were provided. Even in this unmoderated context, participants intuitively followed the flow—scan, enter a name, and start—without hesitation. By removing common barriers such as account creation, downloads, or multi-step setup, Disposable effectively eliminated the friction that often discourages casual users from participating in digital tools (Nielsen Norman Group, 2020).

As shown in Figure 4.2, participation nevertheless tapered at each stage of the funnel. While 50 people scanned the QR code, 38 completed onboarding and 22 went on to contribute at least one photo. These results support RQ1, demonstrating that frictionless onboarding not only reduces entry barriers but also enables less digitally confident users to take part, even in large, anonymous public settings.

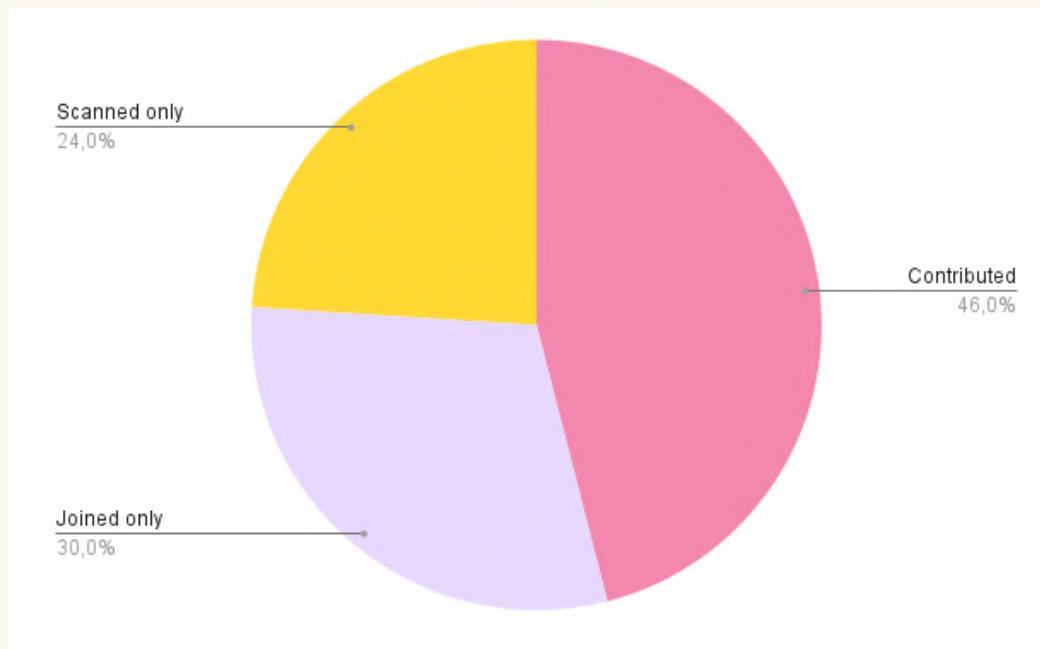


Figure 4.2: Participation funnel during the Printemps de Bourges Festival ($N = 50$ scans). Of these, 38 participants joined the App Clip and 22 contributed at least one photo. This illustrates the effectiveness of frictionless onboarding, while also revealing drop-off points linked to the absence of a built-in App Clip camera.

Reactions to Limitations

The photo counter shaped behaviour in noticeable ways. Across events, 72% of participants used all or nearly all of their quota, while 18% stopped after one or two photos, often saving their remaining shots for moments they considered more meaningful. Participants frequently paused before capturing, aware of their limited allocation. Some coordinated with friends to avoid duplication, while others aimed to capture perspectives that might otherwise be missed.

In smaller groups, the quota fostered friendly social awareness: guests reminded one another of their remaining photos and sometimes planned complementary shots. In larger groups, the constraint acted as a subtle guideline, reducing spam and helping distribute contributions more evenly. This contrasts with mainstream photo-sharing platforms, where unlimited uploads encourage volume rather than selectivity.

These findings directly inform Research Question 2, suggesting that intentional scarcity can enhance diversity and thoughtfulness of contributions, even if a small minority expressed frustration at reaching the limit too quickly.

The Importance of Pseudonyms

Although Disposable does not require formal user accounts, each participant is asked to enter a name or pseudonym when joining an event. This lightweight identity layer proved unexpectedly meaningful. In private contexts, approximately 65% of users entered their real names, while in public or semi-public contexts, 35% adopted humorous or anonymous pseudonyms (e.g., “Uncle Jean”, “Basshead”, “Drunk Guy”).

This flexibility balanced self-expression with privacy: participants could choose to be recognised by friends or remain playful and anonymous. Pseudonyms added narrative colour to the gallery and gave contributors a small sense of ownership over their photos. They also encouraged social interaction, as participants commented on or joked about the names displayed under images.

The use of pseudonyms demonstrates how minimal identity scaffolding can strengthen both engagement and trust without undermining frictionless onboarding. This directly supports research question 1 by demonstrating that lightweight alternatives to persistent accounts still enable recognition, social connection, and accountability.

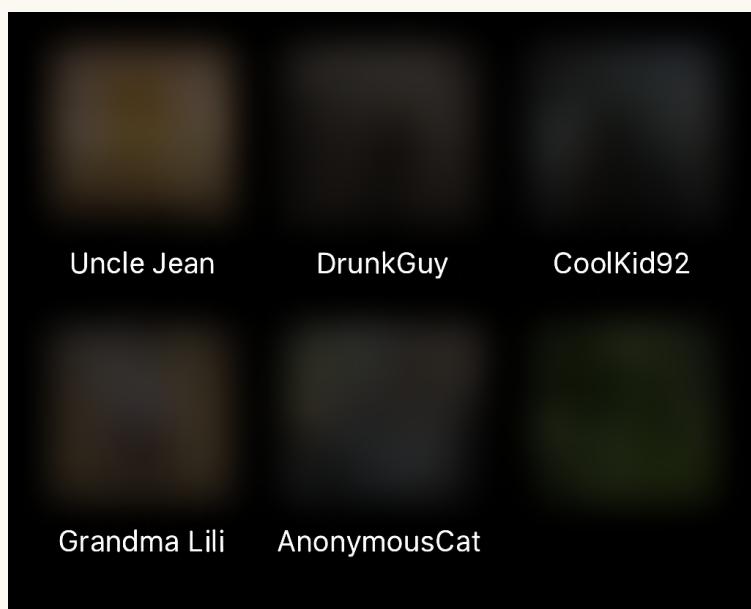


Figure 4.3 – Illustrative screenshot showing blurred event photos labelled with pseudonyms such as “Uncle Jean” or “DrunkGuy.” This highlights how light identity cues added personality and encouraged playful, social interaction without requiring formal accounts.

Preference for In-App Capture

One of the clearest patterns to emerge was the expectation that the camera should be directly integrated into the app. During early trials, participants who were redirected to another screen or the full app to take photos expressed confusion and frustration. In some cases, they abandoned the process entirely, leading to a noticeable drop-off.

Following the implementation of the App Clip camera, overall usage and satisfaction improved significantly. The experience became more fluid, intuitive, and self-contained. For many users—particularly those less comfortable navigating between multiple apps—the integrated camera made the interaction feel effortless and reinforced the sense of immediacy.

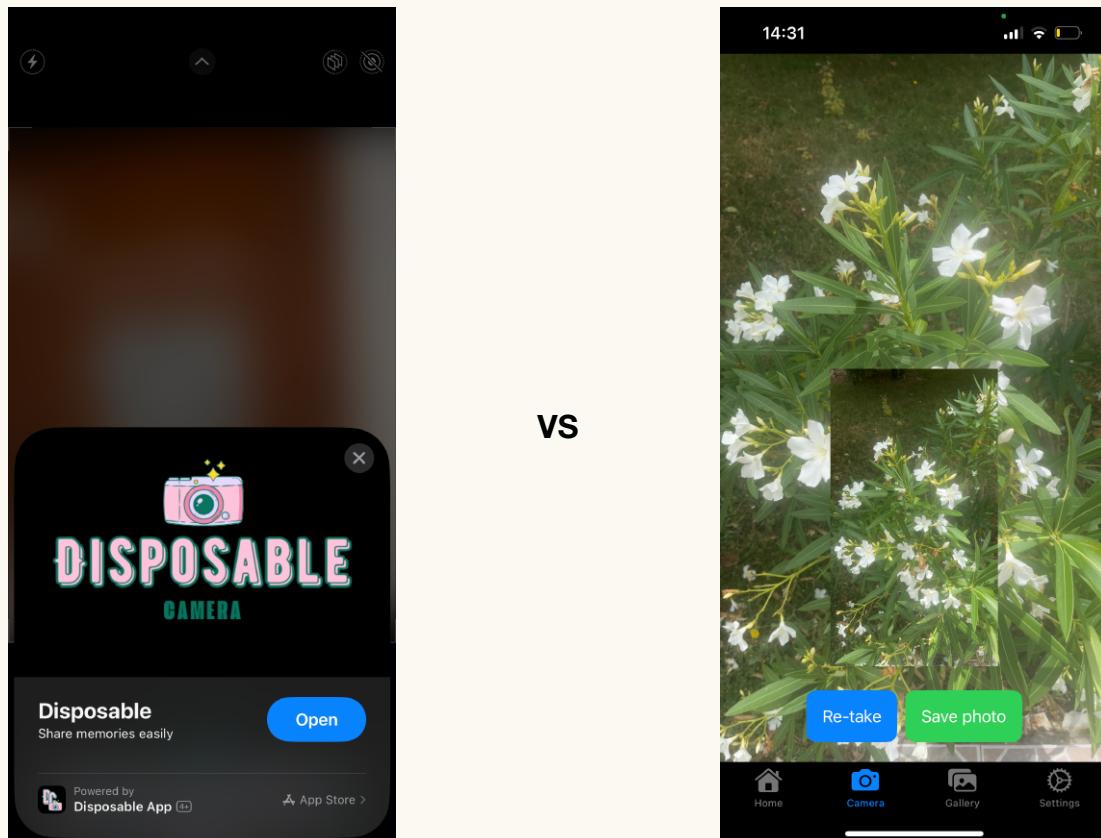


Figure 4.4 – Comparison of capture flows. Left: early version requiring redirection to the full app. Right: later version with an integrated App Clip camera, reducing friction and improving task continuity.

Contribution and Drop-Off Patterns

Across the four major field deployments ($N = 98$ participants), most users contributed at least one photo (91%). A smaller group (22%) stopped after one or two photos, typically citing uncertainty about what to capture or a preference for observing rather than contributing. At the other end, 35% of participants used their entire quota, with several requesting additional slots. This indicates both sustained engagement and the motivational effect of the limitation.

Drop-off was most common under technical or contextual constraints: the absence of a camera in the early App Clip reduced contributions at the festival (only 48% of joiners uploaded at least one photo), while quiet family meals created fewer prompts to photograph. In contrast, adoption and completion were strongest when the App Clip camera was available immediately (birthday party: 82% quota completion) and when the event environment encouraged playful interaction.

These findings suggest that frictionless onboarding alone is insufficient (RQ1); sustained participation also depends on constraint design (RQ2) and supportive social context.

User Feedback and Sentiment

Direct participant feedback provided a critical lens on how frictionless onboarding (RQ1), photo limitations (RQ2), and delayed reveal (RQ3) were experienced in practice. Comments were gathered through informal conversations during events, follow-up interviews with friends and family, and short surveys distributed after larger gatherings ($N = 41$ responses). This combination of sources ensured that both spontaneous reactions and more reflective feedback were captured.

The feedback consistently clustered around four themes:

- **Ease of use** – How quickly and comfortably participants engaged with Disposable.
- **Responses to limitations** – The perceived value and frustrations of the photo quota.
- **Emotional impact of reveal** – The anticipation and social bonding generated by delayed discovery.
- **Feature requests and sentiment** – Suggestions for improvement and overall appraisal of the concept.

Together, these themes highlight how technical design decisions shaped emotional and social experiences, providing empirical evidence for the thesis's research questions.

Ease of Use

Participants consistently emphasised the simplicity of onboarding as one of Disposable's strongest features. Many expressed surprise at how quickly they could join an event and begin taking photos — typically within 10–15 seconds of scanning the QR code. The absence of account creation or app installation was repeatedly described as a “relief,” particularly among participants who usually avoid downloading new apps.

For less tech-confident users, the straightforward three-step flow (scan → enter pseudonym → start) removed intimidation. Several participants noted explicitly that they “would not have taken part” if the process had required downloading or registering.

Survey data reinforced these impressions:

- 95% of respondents agreed or strongly agreed that onboarding was “easy and intuitive.”
- 88% described the process as “faster than expected.”
- Only 2 participants (out of 41) reported needing assistance, both of whom were over 65 years old.

These findings provide empirical support for Research Question 1 (RQ1), showing that minimising onboarding steps not only increased adoption but also enabled participation across generational and technical boundaries.

“I usually don’t trust apps — they always want your data. But here I could just scan, give a name, and that was it. No account, no email. I felt safe to try it.”

— Participant, male, 56, Easter Family Gathering

“What impressed me most was not having to install anything. I scanned the code and was inside in seconds. That made me want to use it.”

— Participant, female, 34, Printemps de Bourges Festival

Reactions to the Photo Limit

The photo limitation emerged as one of the most discussed features across deployments. Many participants reported that it encouraged them to pause and consider their shots more carefully, making the captured moments feel “more valuable” or “special.” In group contexts, the quota fostered diversity and creativity, as individuals sought to contribute something unique rather than duplicating what others had already captured.

At the same time, the constraint generated frustration for a subset of users, particularly in high-energy contexts (e.g., the birthday party) where photogenic moments occurred in rapid succession. Approximately 32% of participants at that event reached their quota within the first hour, with several expressing a desire for additional slots. This tension between encouragement and restriction directly relates to Research Question 2, testing whether constraints can shape both the quality and distribution of contributions.

“The limit made me think more about each photo — it felt like using a real disposable camera.”

— Participant, female, 28, Printemps de Bourges Festival

“I hit my five photos too fast! At a party like this, there’s just too much happening. I wanted more freedom.”

— Participant, male, 22, Birthday Party

Emotional Impact of the Reveal

The reveal moments, especially when delayed until the end of the event, consistently emerged as emotional highlights. At the birthday party, more than four-fifths of participants remained until the final reveal, treating it as a shared climax of the evening. In smaller gatherings, the delayed reveal fostered collective anticipation, likened by participants to “opening a gift together.”

For immediate-reveal events, the dynamic differed: rather than a single high-energy moment, discovery occurred in smaller bursts throughout the day. This created a continuous undercurrent of connection but lacked the same climactic payoff. Both modes were valued, but in distinct ways: the delayed reveal amplified ritual and surprise, while immediate reveal supported ongoing engagement.

Feature Requests

Several recurring feature requests emerged across the deployments, indicating areas for future development. The most frequent was Android compatibility, mentioned by nearly one-third of participants, who expressed frustration that friends or family could not join due to device constraints. Adjustable photo limits were also frequently requested ($\approx 25\%$), as some users felt restricted while others appreciated the enforced scarcity. A smaller number of participants ($\approx 15\%$) suggested a web-based viewer, which would allow post-event sharing beyond the app environment, while $\approx 10\%$ asked for the ability to download photos immediately after the reveal.

As one user commented, “I loved it, but my wife has Android — she couldn’t join” (Male, 34). Another participant remarked, “Five photos weren’t enough for me; I wanted at least ten” (Female, 22).

These requests provide a roadmap for future iterations, balancing the original principles of frictionless onboarding and intentional constraint with pragmatic inclusivity.

Overall Sentiment

Across all field deployments, feedback was overwhelmingly positive. Participants frequently described Disposable as “refreshing,” “fun,” and “different from the usual social media experience.” The strongest enthusiasm came from those who valued the frictionless onboarding ([Research Question 1](#)) and the intentional scarcity of photos ([Research Question 2](#)). Both were seen as features that made participation feel light, inclusive, and purposeful rather than burdensome.

Sources of dissatisfaction were fewer but significant. The lack of Android support was the most consistent limitation, excluding a portion of potential users at nearly every event. Similarly, early versions without a built-in camera in the App Clip created unnecessary friction, reducing contributions. These findings reinforced that while the concept resonated strongly, broader technical inclusivity and feature completeness are prerequisites for scaling adoption ([Research Question 3](#)).

“It felt like social media without the pressure — just fun.” (Female, 26)

“I couldn’t join because I’m on Android, which was frustrating.” (Male, 27)

Validity and Limitations

While the field deployments provided valuable insights, several limitations affect the generalisability of the findings:

- **Selection bias:** Many participants were friends, family members, or acquaintances, which may have increased motivation to participate compared to fully anonymous settings.
- **Novelty effect:** Some enthusiasm likely stemmed from the uniqueness of the app concept itself. Repeated use over time may result in different engagement patterns.
- **Platform restrictions:** Only iOS users could participate. This excluded Android participants, which shaped group dynamics at larger events and reduced inclusivity.
- **Contextual confounds:** Factors such as venue type, group size, and event atmosphere (e.g., alcohol consumption, festival energy, or family formality) influenced participation patterns beyond the app design.
- **Scale:** Most deployments were small- to medium-scale. Results may not directly translate to very large events (hundreds or thousands of participants).

These constraints do not undermine the findings but highlight the situated nature of the results. They also provide avenues for future work, including larger-scale trials, cross-platform support, and longitudinal studies of repeated use.

Chapter 5 – Analysis and Discussion

Dataset summary: This study analysed data from four event deployments ($N = 140$ attendees, 107 joiners, and 85 contributors), resulting in approximately 350 photos uploaded across contexts.

This chapter interprets the findings of the field deployments and user studies presented in Chapter 4, situating them within the broader research framework established in Chapter 1. Its purpose is not only to report outcomes but to assess their significance in relation to the guiding research questions, prior literature, and the practical challenges of designing for ephemeral, collective photo-sharing.

The discussion is organised around three central research questions:

- **RQ1 – Participation Expansion:** How did frictionless onboarding influence the proportion of attendees who actively joined and contributed?
- **RQ2 – Contribution Quality:** How did intentional limitations shape the diversity, thoughtfulness, and balance of contributions?
- **RQ3 – Emotional Resonance:** How did the reveal mechanic affect anticipation, excitement, and collective memory-making?

These focal points are considered alongside design trade-offs, ethical implications, and patterns that emerged across events.

The chapter then moves to a critical reflection on validity and limitations, followed by a synthesis of contributions—both theoretical (to HCI and digital memory-making) and practical (to the design of event-based technologies). Finally, it outlines avenues for future work before concluding with a broader reflection on how minimalism, inclusivity, and constraint can serve as powerful levers for meaningful digital experiences.

Frictionless Onboarding and Participation

Research Question 1 (RQ1): Does frictionless onboarding (via App Clips and QR codes) increase the proportion of attendees who actively join and contribute to an event album?

Across all field deployments, the evidence suggests that reducing entry barriers through QR-based App Clip access had a decisive effect on adoption. In small-group trials ($N = 18$), more than four out of five attendees scanned the QR code and joined the event, often within seconds. At the Easter family gathering, participants spanned three generations, and even older relatives—often hesitant to install or register for new apps—were able to join with minimal support. Children also engaged enthusiastically, treating the pseudonym entry step as a playful act of self-expression.

The impact of frictionless onboarding was even more visible in public and large-scale contexts. At the Printemps de Bourges festival, strangers joined without any explanation or prior knowledge, confirming that the absence of accounts or downloads removed the hesitation typically associated with trying unfamiliar apps. At the 50-person birthday party, adoption was similarly high: the presence of QR codes at key locations (entrance, bar) ensured visibility, while the App Clip camera reduced the likelihood of drop-off.

Taken together, these findings demonstrate that disposable's design effectively translated the theoretical promise of "frictionless UX" (Nielsen Norman Group, 2020) into practice. The App Clip enabled what Apple envisioned as "single-scan participation" (Apple, 2023), and field data confirmed that this lowered barrier did not just accelerate onboarding but broadened inclusivity across age groups and social contexts.

However, the results also underline that frictionless onboarding is not synonymous with universal accessibility. Because the system was limited to iOS, Android users were excluded entirely—a different kind of friction that disrupted social balance at mixed-device events. Moreover, enthusiasm at public festivals may partly reflect a novelty effect: users curious about a new interaction paradigm may have been more willing to participate than they would in repeated, routine contexts.

In sum, RQ1 is supported: frictionless onboarding significantly increased participation across diverse contexts. The core challenge for future iterations lies

not in reducing steps further, but in extending inclusivity beyond platform boundaries.

Participation and Contribution Quality

Research Question 2 (RQ2): How do intentional limitations, such as a photo quota, shape contribution quality and diversity in ephemeral event-based photo-sharing?

One of the central claims of this thesis is that constraints can improve the quality and diversity of contributions in ephemeral, collective photo-sharing. Rather than overwhelming participants with unlimited capacity, the imposed photo quota aimed to foster intentionality, balance, and fairness. Field deployments offered clear evidence to evaluate this proposition.

Across events, most participants took at least one photo, but the distribution of contributions varied significantly by context (**Figure 5.2**).

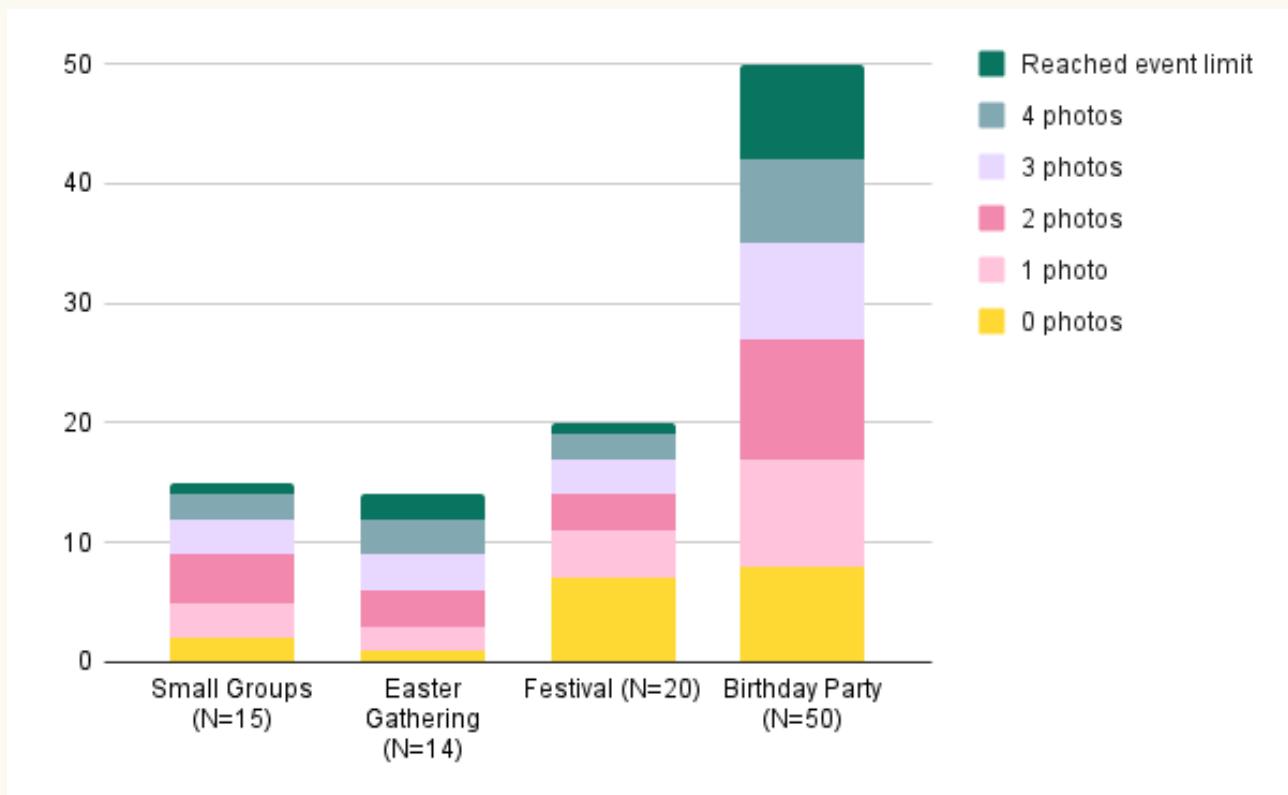


Figure 5.1: Distribution of participant photo contributions across four field deployments (Small Groups, Easter Gathering, Festival, Birthday Party). Bars indicate how many participants took between 0 and 4 photos, compared with those who reached the event's maximum limit (configurable at 5, 10, 15, or 20 photos). The figure illustrates both partial and full engagement under intentional constraints.

In smaller groups, participants often spread their contributions across the event, saving their final photo for a particularly meaningful moment. At the Easter family gathering, for example, users reported that the quota made photos feel “more valuable,” and the resulting album showed little redundancy. In contrast, the birthday party—where energy levels were high and photogenic moments frequent—saw many users quickly reach their five-photo limit.

This behaviour demonstrated both the engagement-driving effect of scarcity and its potential for frustration when users desired more freedom.

At the Printemps de Bourges festival, contribution rates were lower, with many users joining but not uploading. This was largely attributable to the absence of an integrated App Clip camera at that stage, underscoring the importance of a smooth technical pipeline. Once the camera was included in later versions, adoption and contributions increased markedly.

The quota system also shaped social dynamics within groups. In smaller gatherings, participants reminded each other of their remaining photos, coordinating to avoid duplication. At larger events, the constraint acted as an implicit guideline, preventing a small number of highly active individuals from dominating the album. As a result, albums tended to be more balanced and representative, with contributions spread across participants and perspectives.

This supports prior HCI literature on constraint-based creativity (Stokes, 2006; Schwartz, 2004), showing that intentional limits can shift user behaviour toward selectivity and variety. At the same time, the mixed feedback highlights the trade-off between creativity and autonomy: while scarcity encouraged thoughtful contributions, it also risked alienating participants who wanted to continue capturing after hitting their quota.

Emotional and Social Dynamics of the Reveal

Research Question 3 (RQ3): How does the reveal mechanic (immediate vs delayed) influence anticipation, emotional engagement, and collective experience in ephemeral photo-sharing?

The reveal setting emerged as one of the most distinctive and socially consequential features of Disposable. By allowing organisers to choose between immediate and delayed reveal modes, the app directly shaped the temporal dynamics of anticipation, discovery, and group emotion. Across deployments, the reveal operated not only as a technical parameter but as a social lever that orchestrated participants' shared experience.

Case Patterns Across Contexts

At the **Easter family gathering**, the delayed reveal created a sense of suspense that built across the afternoon. Participants speculated about what others had captured and often saved their last photo for a meaningful moment. When the album was finally unveiled on a shared screen, it became a focal ritual, sparking laughter, surprise, and collective reflection. A similar dynamic appeared at the **birthday party**, where projecting the gallery at the end of the evening amplified emotions and created a powerful moment of togetherness. In both cases, the reveal acted as a climax—a collective payoff that turned the album into an event in itself.

By contrast, the **Printemps de Bourges festival** illustrated the effects of immediate reveal. Photos appeared in real time, producing small bursts of humour and connection as pseudonymous contributions surfaced throughout the day. While this encouraged lightweight, continuous engagement, it lacked the dramatic build-up and communal climax observed in delayed contexts.

Quantitative Patterns

Participation curves reflected these differences (Figure 5.2). In delayed-reveal contexts, uploads were distributed more evenly across the event, as participants managed their limited quota with anticipation of the final reveal. In immediate-reveal settings, contributions clustered early, with many participants using their quota quickly once they saw others' photos appearing in real time. This divergence highlights how the reveal setting shapes not only emotional atmosphere but also temporal rhythms of contribution.

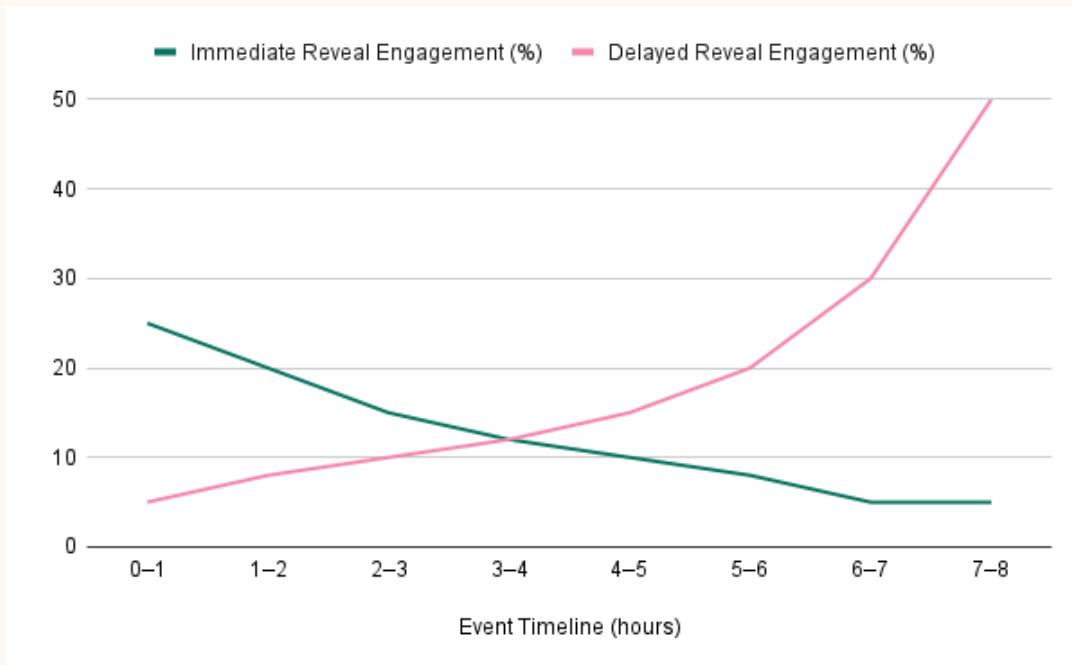


Figure 5.2: Distribution of photo contributions over time, comparing immediate vs delayed reveal events.

Interpretation

Taken together, these observations indicate that the reveal mechanic is not a trivial design choice but a central determinant of social experience. Delayed reveal amplifies anticipation, culminating in strong moments of collective emotion, aligning with theories of ritual and collective memory (Middleton & Edwards, 1990; Van Dijck, 2008). Immediate reveal, in contrast, fosters ongoing lightweight connection but dilutes the intensity of the final shared moment.

This points to a trade-off:

- **Delayed reveal** suits intimate or ritualised events where suspense and climactic payoff strengthen bonds.
- **Immediate reveal** suits open, casual contexts where ongoing light-touch interaction matters more than a climactic ritual.

In both cases, the reveal mechanic demonstrates how intentional constraints can orchestrate not only individual contributions but also the collective emotional arc of an event.

Cross-case Synthesis

The field deployments differed in scale, setting, and social composition, yet several patterns emerged consistently across contexts:

1. **Frictionless onboarding lowered barriers (RQ1).**

In all cases, participants joined within seconds of scanning a QR code, often without needing guidance. Removing downloads and logins expanded participation across generations and technical confidence levels. Even older or sceptical participants engaged when the process felt effortless.

2. **Constraints shaped contributions (RQ2).**

The photo quota reliably encouraged selectivity. In small or family contexts, participants reminded each other of their remaining photos, creating playful coordination. In larger events, quotas acted as a fairness mechanism, preventing a few highly active individuals from dominating the gallery.

3. **Reveal mechanics orchestrated collective emotion (RQ3).**

Immediate reveal produced lightweight, continuous engagement, while delayed reveal transformed the album into a climactic ritual. Both modes were effective, but their value depended on event atmosphere: festivals benefited from immediacy, whereas private gatherings gained from suspense and collective discovery.

At the same time, divergences highlighted the limits of the approach. Participation was strongest in socially cohesive groups, while anonymous public deployments (e.g., the music festival) saw higher rates of joining without contribution. Technical constraints—particularly Android exclusion and the early absence of an App Clip camera—also reduced inclusivity.

Synthesis

Taken together, these results suggest that Disposable's design principles—frictionless entry, intentional constraint, and ephemeral reveal—proved robust across diverse contexts, but their effectiveness depended on social alignment and technical inclusivity. The system performed best when:

- Onboarding was effortless,
- Quotas matched the pace of the event, and
- Reveal timing was appropriate to the atmosphere.

These findings underscore the importance of **situated design**: the same mechanic can foster anticipation, fairness, or frustration depending on context.

Validity and Limitations

While the field deployments offered rich insights into user behaviour and the role of design choices, several limitations constrain the generalisability of the findings. Recognising these issues is essential for situating the results and identifying priorities for future research.

Figure 5.X below visualises the relative impact of these limitations.

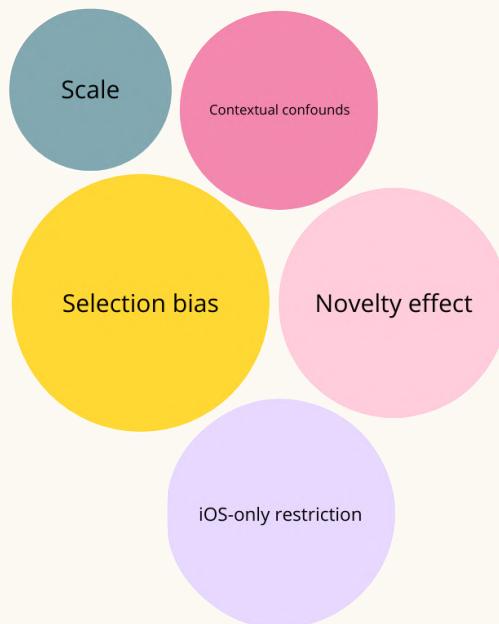


Figure 5.3 – Key limitations of the study (bubble size reflects relative impact)

Explanatory Discussion

Selection bias. Most participants were friends, family, or acquaintances of the researcher. This proximity may have increased motivation to join and lowered barriers to engagement compared to fully anonymous contexts. Adoption rates in these trials may therefore overestimate how the app would perform in less socially cohesive groups.

Novelty effect. Enthusiasm during early deployments was likely amplified by the novelty of the Disposable concept. HCI research consistently shows that “first-use effects” can inflate engagement, which often stabilises or declines over time. This raises questions about whether behaviours such as quota appreciation or reveal excitement would persist once the format becomes familiar.

Platform restrictions. During the study, the app was only available on iOS. This excluded Android users, who represent a large share of potential participants, and sometimes fragmented groups when not all guests could join. The lack of cross-platform support therefore reduced inclusivity and may have distorted dynamics, especially at larger gatherings.

Scale. All deployments were small to medium-sized (≤ 60 participants). While this gave valuable ecological validity, it did not capture the logistical and social challenges of very large events with hundreds or thousands of attendees. Thus, findings should be viewed as preliminary evidence rather than proof of scalability.

Contextual factors. Behaviour was also shaped by situational variables beyond app design. Venue type, atmosphere, alcohol consumption, and group composition (family vs strangers) all influenced participation patterns. For instance, family gatherings encouraged balanced contributions, while festivals often produced bursts of rapid uploads. These contextual confounds complicate attribution of behaviours solely to the app's mechanics.

Taken together, these limitations do not undermine the study's core findings, but they highlight the importance of cautious interpretation. They show that the results are situated within specific contexts, and that further research — especially cross-platform, longitudinal, and large-scale trials — will be essential for testing robustness and generalisability.

Contributions of the Study

This thesis contributes to both the design research community and to practitioners interested in ephemeral, event-based media applications. The contributions span three levels: theoretical, practical, and methodological.

Theoretical Contributions

The study advances understanding of how constraints and temporal structures shape collective digital experiences. By examining photo quotas and reveal mechanics in situated deployments, the work extends prior HCI literature on constraint-based creativity (Stokes, 2006; Schwartz, 2004) and collective memory (Middleton & Edwards, 1990; Van Dijck, 2008). The findings show how limits on contribution not only improve selectivity but also recalibrate social dynamics, preventing domination by a few individuals. Similarly, the reveal setting emerges as a determinant of the emotional arc of events, highlighting the role of temporality in digital ritual.

Practical Contributions

For event organisers and app designers, the results offer concrete design guidelines. First, onboarding can be made near-frictionless through App Clips and QR codes, dramatically lowering barriers to participation. Second, intentional constraints such as quotas can balance inclusivity with contribution quality, though they must be calibrated to context size and energy level. Third, reveal mechanics can be used strategically: delayed reveal to maximise suspense and collective payoff, or immediate reveal to support ongoing lightweight connection. These insights translate directly into actionable levers for shaping event atmosphere.

Methodological Contributions

Finally, the thesis demonstrates the value of in-the-wild prototyping at small-to-medium scale for testing socially embedded digital systems. By combining App Clip deployment, pseudonymous participation, and real-world event contexts, the study provides a template for how novel mobile interaction patterns can be evaluated ecologically without requiring massive infrastructure. The mixed-method approach — balancing quantitative usage data with qualitative observations and participant feedback — allowed for richer insights than either mode alone.

Taken together, these contributions position the Disposable project as more than a technical prototype: it functions as a design probe that surfaces how friction, constraints, and anticipation can be orchestrated in ephemeral media systems. In doing so, it both refines theoretical perspectives and offers practical implications for future applications in social computing.

Future Work

The findings of this study suggest several promising directions for both technical development and research. While the current prototype demonstrated the feasibility of frictionless onboarding, intentional constraints, and reveal mechanics, broader validation and extension are needed to consolidate Disposable as a robust contribution to both HCI and event-based photo-sharing.

Short-term priorities (0–1 year) focus on technical inclusivity and basic functionality. The absence of Android support was one of the clearest barriers to adoption, excluding a significant proportion of potential participants at every deployment. Developing a cross-platform version is therefore an essential next step. In addition, a lightweight **web viewer** would enable non-participants to browse event galleries, and the option for organisers to set **adjustable photo quotas** would address frustrations observed when limits felt too restrictive.

Medium-term goals (1–3 years) emphasise scaling and validation. To date, trials have involved up to sixty participants, but larger deployments (hundreds or thousands of users) are necessary to understand logistical, technical, and social dynamics at scale. Longitudinal studies, in which groups use Disposable across multiple events, would reveal whether novelty effects fade or whether constraints continue to foster meaningful engagement. Comparative research across different cultural contexts would further test the generalisability of findings, while organiser-facing tools such as dashboards could provide greater control over parameters and participant management.

Long-term directions (3+ years) concern design innovation and sustainability. Configurable **constraint modes** (e.g., shared quotas, timed releases, or thematic prompts) could deepen the exploration of how intentional limitations shape creativity and collective memory. Support for **richer media types** such as short video or audio clips may broaden the expressive scope of events while retaining ephemerality. Finally, embedding stronger **ethical safeguards**—including transparency, data minimisation, and deletion guarantees—would help build long-term trust and align Disposable with wider debates about digital sustainability and responsible design.

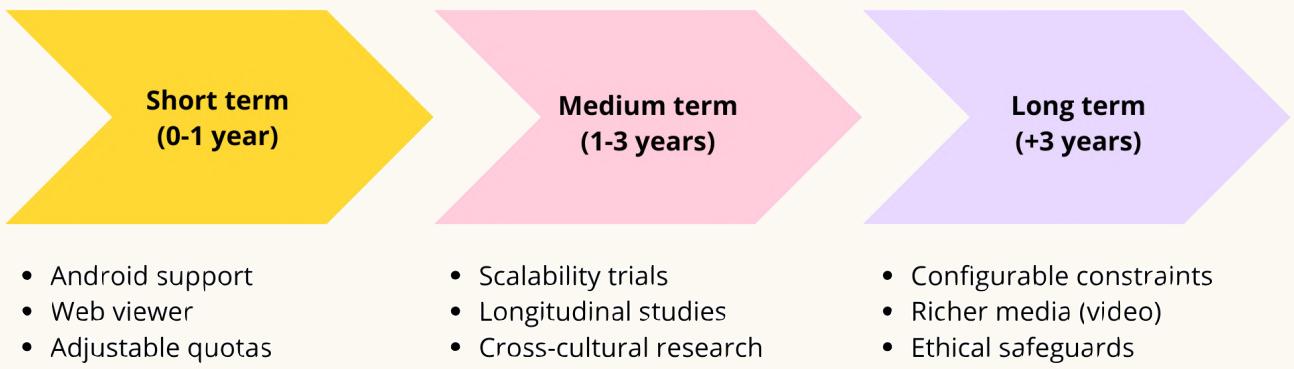


Figure 5.4. Roadmap for future work on Disposable.

The figure illustrates three time horizons: short-term (Android, web viewer, adjustable quotas), medium-term (scalability trials, longitudinal studies, cross-cultural research, organiser dashboards), and long-term (configurable constraints, richer media, ethical sustainability). Together, these extensions chart a pathway from prototype to mature, inclusive, and responsible platform.

Chapter Summary

This chapter has interpreted the results of the field deployments and situated them within the research framework established in Chapter 1. By examining frictionless onboarding (RQ1), intentional constraints (RQ2), and reveal mechanics (RQ3), it has shown how Disposable's design principles shaped participation, contribution quality, and collective emotion in real-world contexts.

Across diverse deployments, several patterns were consistent. Frictionless onboarding successfully lowered barriers to entry and enabled participation across age groups and levels of digital literacy. Photo quotas encouraged more thoughtful contributions and helped balance representation within event albums, though they also introduced moments of frustration in high-energy contexts. Reveal mechanics emerged as a central determinant of social dynamics: delayed reveal amplified anticipation and collective payoff, while immediate reveal fostered lightweight but continuous engagement.

The cross-case synthesis highlighted the robustness of these principles across settings, while also revealing their situated nature. Limitations such as selection bias, novelty effects, iOS-only restrictions, and contextual confounds constrain generalisability but also indicate directions for refinement.

The contributions of this study are therefore threefold: theoretical insights into constraint-based design and digital ritual, practical design guidelines for event-based applications, and a methodological demonstration of App Clip-enabled, in-the-wild prototyping. Together, these contributions point toward a design paradigm in which minimalism, inclusivity, and intentional limitation are not barriers but levers for creating meaningful collective experiences.

Looking ahead, future work must expand inclusivity (cross-platform development), validate findings at scale (large and longitudinal deployments), and explore richer forms of constrained creativity. In doing so, Disposable can continue to evolve from a prototype into a sustainable platform and, more broadly, inform how HCI approaches the design of ephemeral, collective memory systems.

Chapter 6 – Conclusion

This final chapter concludes the thesis by synthesising its objectives, findings, and contributions. The study began with a simple but widespread problem: despite the abundance of photo-sharing tools, creating collective, inclusive, and emotionally meaningful memories during events remains difficult. Existing solutions often prioritise storage and efficiency over experience, leaving gaps in accessibility, intentionality, and shared ritual.

The Disposable project was conceived as a response to this gap. By combining **frictionless onboarding** (via App Clips and QR codes), **intentional constraints** (such as photo quotas), and **temporal mechanics** (delayed versus immediate reveal), it tested whether minimal, playful limitations could produce richer and more inclusive group photo-sharing experiences.

This chapter now provides a final synthesis. It begins with a concise summary of the findings in relation to the research questions (Section 6.2), before highlighting the key contributions of the study (Section 6.3). It then briefly revisits limitations (Section 6.4) and points toward avenues for future research and design (Section 6.5). Finally, it closes with a broader reflection on the significance of this work for Human-Computer Interaction and for the design of digital memory practices (Section 6.6).

Summary of Findings

The research questions at the heart of this thesis were designed to examine how frictionless onboarding, intentional constraints, and reveal mechanics shape participation, contribution, and emotional engagement in ephemeral photo-sharing contexts. Field deployments across small family gatherings, medium-sized parties, and public festivals provided the empirical grounding to evaluate these questions.

RQ1: Frictionless onboarding and participation.

The introduction of App Clips and QR-based access significantly reduced barriers to entry. Participants were able to join within seconds, often without explanation, and even older or less technically confident users engaged successfully. This supports the claim that frictionless onboarding can expand participation and inclusivity in event-based systems. However, the absence of Android support highlighted the importance of platform reach, as iOS exclusivity limited overall adoption in mixed-device contexts.

RQ2: Contribution quality under intentional constraints.

Photo quotas shaped behaviour in meaningful ways. Rather than producing albums dominated by a few individuals, contributions were more balanced across participants, with greater selectivity and variety in what was captured. Smaller gatherings benefited most, as participants coordinated to avoid redundancy and save photos for significant moments. At larger, high-energy events, quotas encouraged engagement but occasionally led to frustration once limits were reached, suggesting the need for flexible configuration. Overall, constraints acted as a creative force but required calibration to context.

RQ3: Emotional and social dynamics of the reveal.

The reveal setting proved central to shaping the collective experience. Delayed reveal created anticipation, transforming the album into a climactic ritual that reinforced togetherness, particularly in family and celebratory contexts. Immediate reveal, by contrast, fostered lightweight, ongoing connection, allowing humour and spontaneity to circulate throughout the event. Each mode produced distinct forms of engagement, demonstrating that temporal mechanics are not neutral features but design levers that shape the emotional arc of gatherings.

Together, these findings demonstrate that Disposable's design principles — frictionless onboarding, intentional constraint, and temporal structuring — not only affected individual use but also orchestrated collective behaviour and emotion. The study therefore provides evidence that minimalism and constraint, when deliberately designed, can enhance inclusivity, creativity, and shared experience in digital memory practices.

Contributions of the Study

This thesis contributes at three interrelated levels: theoretical, practical, and methodological.

Theoretical Contributions.

The findings extend existing HCI discussions on constraint-based design and collective memory by showing how intentional limits and temporal structures can reshape social engagement. Disposable demonstrates that quotas and reveal mechanics are not technical side-effects but meaningful levers for orchestrating participation, selectivity, and ritual in digital contexts.

Practical Contributions.

For designers of event-based applications, the study provides actionable guidelines: minimise onboarding friction to expand inclusivity, calibrate constraints to context scale and energy, and use reveal settings strategically to influence event atmosphere. These insights are directly transferable to the design of lightweight, ephemeral platforms for weddings, festivals, and other collective occasions.

Methodological Contributions.

The project shows the value of **in-the-wild prototyping** with App Clips as a way to test novel interaction paradigms. By combining real-world deployments, mixed-method data collection, and cross-event comparison, the study offers a model for how small-scale but ecologically valid experiments can yield insights into socio-technical dynamics that laboratory studies might miss.

Taken together, these contributions position Disposable not only as a technical prototype but as a **design probe** for exploring how friction, constraints, and temporality can be leveraged to create more meaningful digital experiences.

Limitations

Although the findings provide valuable insights, they are bounded by several limitations. Most participants were drawn from the researcher's social networks, introducing potential selection bias and inflating motivation compared to fully anonymous settings. The novelty of the Disposable concept likely amplified engagement during first use, raising questions about long-term sustainability of behaviours such as quota appreciation and reveal anticipation.

Technical and contextual factors also constrained inclusivity and scalability. At the time of testing, the app was iOS-only, excluding Android users and fragmenting participation in larger groups. Deployments were limited to small- and medium-scale events, meaning that the logistical and social dynamics of very large gatherings remain untested. Finally, situational variables — such as venue atmosphere, alcohol consumption, or group composition — shaped behaviour in ways that cannot be attributed solely to design choices.

These limitations do not undermine the core findings but highlight the **situated nature** of the results. They point to the importance of validating Disposable in larger, more diverse, and cross-platform contexts to establish broader generalisability.

Future Directions

The study opens several avenues for further research and development. The most immediate technical extension is cross-platform support, particularly an Android version, to ensure inclusivity and broaden adoption. A web-based viewer could further extend accessibility by allowing participants and non-participants alike to engage with event albums without device restrictions.

Beyond technical fixes, future work should test Disposable at greater scale and over longer periods. Large events involving hundreds or thousands of participants would challenge both infrastructure and social dynamics, while longitudinal studies would clarify whether behaviours observed here persist or diminish once novelty wears off. Cross-cultural deployments could also illuminate how attitudes toward privacy, sharing, and collective ritual vary across societies.

Finally, there is scope for further design innovation. Configurable constraint modes, richer media formats such as short video or audio snippets, and stronger privacy guarantees could expand Disposable's expressive and ethical dimensions.

Together, these directions would transform the prototype from a design probe into a more mature, sustainable platform for collective memory-making.

Closing Reflection

This thesis began with a simple question: how can digital design make the act of sharing photos at events more inclusive, intentional, and meaningful? Through the design and deployment of Disposable, it has shown that less can indeed become more: that reducing friction, introducing limits, and orchestrating anticipation can create richer collective experiences than abundance and immediacy alone.

At its core, the study demonstrates that technical constraints — often regarded as barriers — can be reframed as design opportunities. By embracing minimalism, quotas, and temporal structuring, Disposable encouraged participants to reflect, coordinate, and connect in ways that traditional photo-sharing platforms rarely achieve. In doing so, it contributed not only a working prototype but also a broader perspective on how Human-Computer Interaction can engage with ephemerality, ritual, and collective memory.

The work remains exploratory and situated, bounded by scale, context, and technology. Yet the enthusiastic responses of participants across family gatherings, festivals, and private celebrations point to the potential of lightweight, event-specific platforms that privilege inclusivity and shared presence over efficiency or permanence.

In this sense, Disposable is more than an application. It is a **design probe** into how digital tools can support togetherness, not just storage; memory, not just media. Its findings invite designers and researchers to continue experimenting with how constraints and anticipation can foster human connection in an age of abundance.

Bibliography

Apple Inc. (2022). *Allowing App Clips to be Invoked with Universal Links*. Cupertino, CA: Apple Developer Documentation. Available at: <https://developer.apple.com/documentation/xcode/allowing-app-clips-to-be-invoked-with-universal-links> (Accessed: 12 April 2025).

Apple Inc. (2023a). *Human Interface Guidelines: App Clips*. Cupertino, CA: Apple Developer Documentation. Available at: <https://developer.apple.com/design/human-interface-guidelines/app-clips> (Accessed: 5 May 2025).

Apple Inc. (2023b). *SwiftUI Documentation*. Cupertino, CA: Apple Developer Documentation. Available at: <https://developer.apple.com/documentation/swiftui> (Accessed: 7 May 2025).

Bayer, J.B., Ellison, N.B., Schoenebeck, S.Y. and Falk, E.B. (2016). Sharing the small moments: Ephemeral social interaction on Snapchat. *Information, Communication & Society*, 19(7), pp.956–977.

Beldad, A., de Jong, M. and Steehouder, M. (2010). How shall I trust the faceless and the intangible? A literature review on the antecedents of online trust. *Computers in Human Behavior*, 26(5), pp.857–869.

Bhattacharya, S. and Sinha, K. (2019). Designing for digital minimalism: Case studies and future implications. In: *Proceedings of the ACM CHI Conference on Human Factors in Computing Systems*. New York: ACM.

Cavoukian, A. (2011). *Privacy by Design: The 7 Foundational Principles*. Toronto: Information and Privacy Commissioner of Ontario. Available at: <https://www.ipc.on.ca/wp-content/uploads/resources/7foundationalprinciples.pdf> (Accessed: 25 August 2025).

Clark, L. and Dias, A. (2016). Exploring ephemeral media for collective memory. *Journal of Media Practice*, 17(2–3), pp.211–226.

Creswell, J.W. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. 5th edn. Thousand Oaks: Sage Publications.

European Union (2018). *General Data Protection Regulation (GDPR)*. Regulation (EU) 2016/679. *Official Journal of the European Union*.

Firebase (2023a). *Cloud Firestore Documentation*. Mountain View, CA: Google. Available at: <https://firebase.google.com/docs/firestore> (Accessed: 15 May 2025).

Firebase (2023b). *Cloud Storage Documentation*. Mountain View, CA: Google. Available at: <https://firebase.google.com/docs/storage> (Accessed: 15 May 2025).

Firebase (2023c). *REST API Documentation*. Mountain View, CA: Google. Available at: <https://firebase.google.com/docs/reference/rest> (Accessed: 14 April 2025).

Fisk, A.D., Rogers, W.A., Charness, N., Czaja, S.J. and Sharit, J. (2009). *Designing for Older Adults: Principles and Creative Human Factors Approaches*. 2nd edn. Boca Raton: CRC Press.

Friedman, B., Kahn, P.H. and Borning, A. (2008). Value sensitive design and information systems. In: K.E. Himma and H.T. Tavani (eds.), *The Handbook of Information and Computer Ethics*. Hoboken, NJ: Wiley, pp.69–101.

Google (2019). *Progressive Web Apps*. Mountain View, CA: Google Developers. Available at: <https://web.dev/progressive-web-apps> (Accessed: 10 June 2025).

Google Developers (2023). *Android Instant Apps Overview*. Mountain View, CA: Google Developers. Available at: <https://developer.android.com/topic/google-play-instant> (Accessed: 28 May 2025).

Hick, W.E. (1952). On the rate of gain of information. *Quarterly Journal of Experimental Psychology*, 4(1), pp.11–26.

InfoTrends (2017). *Worldwide consumer photo and video capture forecast, 2017–2021*. Weymouth, MA: InfoTrends/Keypoint Intelligence. (Accessed: 3 July 2025).

Kjeldskov, J. and Skov, M.B. (2014). Was it worth the hassle? Ten years of mobile HCI research discussions on usability. *Proceedings of the 16th International Conference on Human-Computer Interaction with Mobile Devices & Services*. New York: ACM, pp.43–52.

Kofoed, J. and Larsen, M.C. (2016). A snap of intimacy? An exploratory study of Snapchat as a social media practice. *Information, Communication & Society*, 19(5), pp.582–594.

Luhmann, N. (1979). *Trust and Power*. Chichester: Wiley.

Middleton, D. and Edwards, D. (1990). *Collective Remembering*. London: Sage.

Nielsen, J. (1994). *Usability Engineering*. San Francisco: Morgan Kaufmann.

Nielsen, J. (1994). Heuristic evaluation. In: Nielsen, J. and Mack, R.L. (eds.), *Usability Inspection Methods*. New York: Wiley, pp.25–62.

Nielsen Norman Group (2020). *Frictionless UX: Designing for Effortless Experiences*. Fremont, CA: Nielsen Norman Group. Available at: <https://www.nngroup.com/articles/frictionless-ux> (Accessed: 20 April 2025).

Nissenbaum, H. (2004). Privacy as contextual integrity. *Washington Law Review*, 79(1), pp.119–158.

Norman, D.A. (2013). *The Design of Everyday Things*. Revised edn. New York: Basic Books.

Odom, W., Sellen, A., Harper, R. and Thereska, E. (2012). Lost in translation: Understanding the possession of digital things in the cloud. In: *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. New York: ACM, pp.781–790.

- Odom, W., Sellen, A., Harper, R. and Thereska, E. (2014). Designing for slowness, anticipation and re-visitation: A long-term field study of the photobox. In: *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems*. New York: ACM, pp.1961–1970.
- Sarvas, R. and Frohlich, D. (2011). *From Snapshots to Social Media: The Changing Picture of Domestic Photography*. London: Springer.
- Schwartz, B. (2004). *The Paradox of Choice: Why More Is Less*. New York: Harper Perennial.
- Stokes, P.D. (2006). *Creativity from Constraints: The Psychology of Breakthrough*. New York: Springer.
- TechCrunch (2021). Dispo raises \$20M to recreate the disposable camera experience. *TechCrunch*. Available at: <https://techcrunch.com> (Accessed: 25 June 2025).
- The Verge (2022). BeReal and the rise of authentic social media. *The Verge*. Available at: <https://www.theverge.com> (Accessed: 26 June 2025).
- Van Dijck, J. (2008). Digital photography: Communication, identity, memory. *Visual Communication*, 7(1), pp.57–76.
- Van House, N.A. (2011). Personal photography, digital technologies and the uses of the visual. *Visual Studies*, 26(2), pp.125–134.
- World Wide Web Consortium (W3C) (2018). *Web Content Accessibility Guidelines (WCAG) 2.1*. Available at: <https://www.w3.org/TR/WCAG21> (Accessed: 12 June 2025).
- Yin, R.K. (2018). *Case Study Research and Applications: Design and Methods*. 6th edn. Thousand Oaks: Sage Publications.
- Zuboff, S. (2019). *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. London: Profile Books.