Congrega - Companion app for Magic: The Gathering

Human Computer Interation final project

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Abstract

In the following sections it will be introduced a companion app for Magic the Gathering, designed to be helpful in high-stress environments such as a MtG encounter. Congrega aims to be a discreet helper for the player, allowing him to focus only to the match, leaving the points recording and the performance measurements to the app.

1. Introduction

Magic: The Gathering is probably one of the most famous and played collectible card game; it has been around since 1993 and reached milion of players worldwide, playing in high-profile tournaments or in improvised single encounters. Regarderless of the situation, every MtG player knows the struggle of a match's management: there are life points, counters and many other informations to keep in mind while thinking to the best strategy for defeat the opponent.

Congrega wants to alleviate this burden, offering a simple and intuitive way to manage all this information. In the following sections there will be described the process of Congrega's design and development, along with some test conducted in a real world scenario: a MtG tournament.

1.1. Magic: the Gathering for the initiate

As stated previously, MtG is a collectible card game where players challenge each other casting *spells*, using *artifacts* and summoning *creatures*. Many variants are available, with their own peculiar differences, but they share a common gameplay: players duel with a constructed deck in a turn based match. A player lost the match if one of the following conditions is met:

- its life points drop to 0 or below;
- when it need to draw a card, but its deck is **empty**;
- it has 10 or more *venom points*;
- a card with victory/defeat effect is triggered;
- has taken 21 or more damage points from a commander (only for *Commander* variant)

A typical MtG match is a best-of-three games, and may ends in parity under certain circumstances. For a profuse and detailed explaination of the game's mechanichs the official website rules' page[4] and Wikipedia article[5] are some excellent resources.

2. Needfinding and features exploration

Design and prototyping is always a difficult task, technical aspects are only a part of the challenges encountered during such process. Knowing about potential users and their interaction with the domain could lead to valued discoveries, allowing to extend or reevaluate some aspects of the project.

2.1. Interviews

For Congrega, needfinding phase comprehended a mix of online surveys and one-to-one interviews: an anonimous survey was promoted in selected communities on Reddit; about 6 people were interviewed during local tournaments in a relaxed and informal place. A total of 14 interviews were been collected then: partecipants were all MtG players, with a different exposure and experience with the game and its world. In both cases, they were asked about:

- their experience with the game;
- their partecipation at tournaments or similar, both as player or host;
- their experience with companion apps;
- their expectations from a companion app.

Interviews shown that the average player has at least 5 years of experience (Figure 1) and plays MtG at least once a week (Figure 2). Companion apps are widely adopted (Figure 3), however a part of the interviewed use traditional methods (eg. paper and pencil) since considered simpler and more reliable.

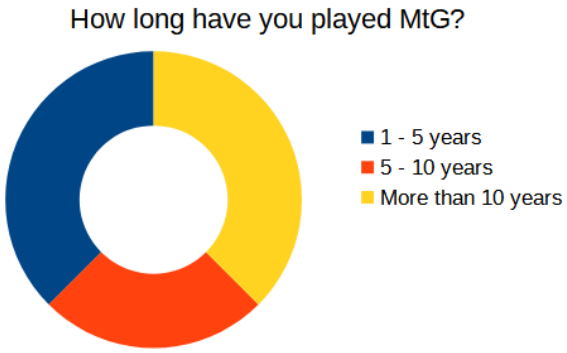

Figure 1. Partecipants' experience with MtG

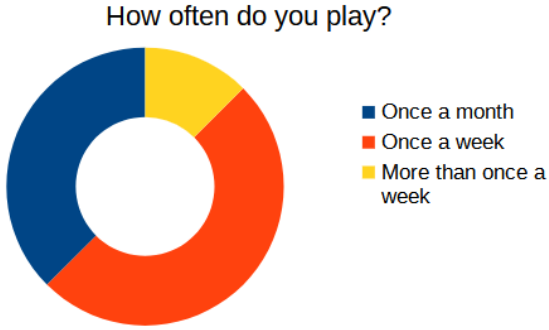

Figure 2. Play frequency

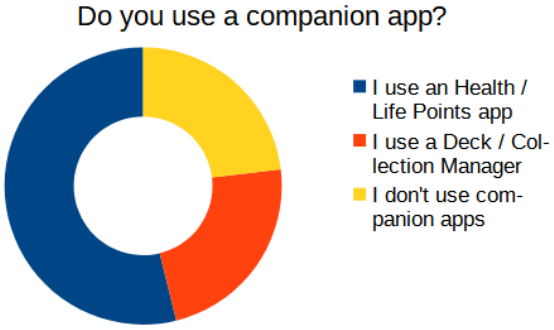

Figure 3. Companion app usage

2.2. Personas

We can identify then few kind of *personas*:

- **Giulia**: she has recently discovered *MtG* and would like to join some events so that she can pratice and have fun. She needs to be concentrated on the game, since she has not completely mastered the rules and mechanics: sometimes she forgot to update her life points or counters.
- **Bernardo**: he is a self employed young businessman that have recently found his cards in a drawer, he has played *Magic: The Gathering* in high school and still remebers the rules (and the fun he had!). He cannot participate at every event, but tries to play at least once every two month, in a local shop or with his friends. Other players have a full blown equipment, he only need an easy way to keep the pace with the cool kids.
- **Manuel**: a passionate player, with a lot of experience. Plays many different decks an likes to host events and meet new players. He wuold like to record his performance among the many matches that he could encounter during a tournament or a private event.

2.3. Scenarios and requirements

Personas can now be placed in their potential contexts, allowing to extrapolate some use cases and requirements, useful for the design process.

1. Giulia is playing in a local shop tournament, she's having fun but it's difficult to her remember the venom points inflicted to her opponent. She would like a simple tool to record this, allowing her to see the current match's status.

2. Bernando is playing with is old friend Niccolò, using a new deck made with some old card. Bernardo casts a spell which requires a 12 faced dice, which neither Bernardo nor Niccolò have. They end up using an online tool but is slow and outdated.

3. Manuel is participating to two different events this week, and would like to test some variations of his ordinary deck. He have a notebook with him but he already know that is going to forget some match. He needs a tool which at least records his wins/losses.

We can now list some feature that suits well the needs of our personas: as first we can certainely imagine a **point tracker**, essential for provide the current situation during a match. Along with that we can also incorporate some useful tools such a **timer, clock and dices**. Another other core functionality is the **performance tracker**, which must keep a log of our victories and defeats. Performance are heavily influenced by the used deck, so a **deck manager** can provide an interesting insight on our performance.

3. Design and Development

3.1. Mockups

Design process starts with sketching the many application's pages and the links between them. In this initial stage, for *Congrega* there are planned the following pages:

- A **welcome and login/signup page**: this will be the first page encountered by the user. Two obviously options will be provided: a login for already registered users and a signup for newcomers.
- **An home page**, embedding buttons or link to the main activites available on Congrega.
- The **life point tracker**, the application's main feature. This page must be easy to understand and easy to use, reducing potential **excise** for the common tasks. Figure 4 shows a potential design.

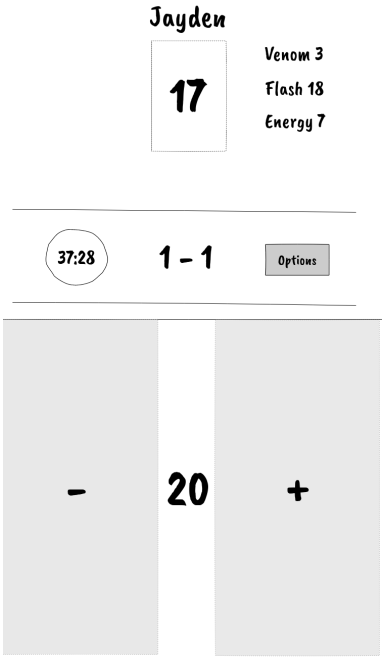

Figure 4. Mockup for life point tracker

- A **statistics page**, where the user will be able to see its performances and manage its decks.

3.2. Prototyping and Implementation

Congrega has been designed with a centered structure in mind: the starting point is the *Dashboard*, from here is possible to access the main functionalities of the application: a **life points tracker**, the user's **profile page**, and some other helpful widgets.

Navigation between pages will be possible with a *Drawer*, a common object introduced by Material Design [3]. Navigation aids like arrows will be available in title bars when navigating in a secondary page.

3.2.1 Home page

After a login/signup, the user lands in the **home screen** (Figure 5), where it can:

- start a match with the **Quick Match** button, leading to the **Life Points tracker**;
- see its statistics, tapping the **Profile** card;
- visualize a brief summary about surrounding events, tapping on one of the events listed in the **Events** widget;
- challenge an user added as a friend in a live match, tapping on his card in the **Friends** widget;

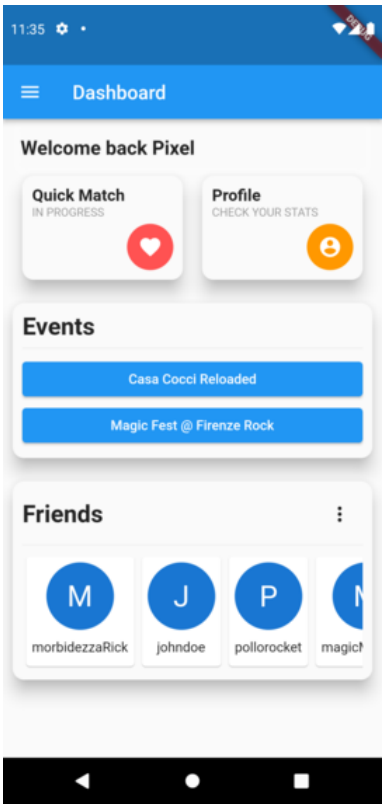

Figure 5. Home page of Congrega

Visual elements in this page are modelled around the *elevation* idiom: every concept is isolated in a elevated element, the user can instantly identify each component in an intuitively way.

3.2.2 Life Point tracker

Being one of most important feature in the app, life tracker page has been designed with some attention to details and user interaction. Page is essentially composed by three main elements:

1. a central bar, in white, holds the match related widgets.

- on the left, a **clock**, reporting the current time. Tapping on it allows the user to replace it with a programmable **timer** or a **stopwatch**.
- on the right, a **dice** shows the possibility of opening a page and throw several kind of coins and dices.
- finally, in the center, a simple widget holds the current **match points**. When tapped, a bottom sheet lifts up and offers the possibility of surrender the current game, or leave the match and close the page.

2. on bottom, the user's points widget, holding life points and counters. When starting a match, this widget contains only life points. Counters can be added sliding down the widget, accessing to a series of switch that enable or disable optional counters.

3. on top, the opponent's points. In an offline match this widget must face the opponent, thus is flipped and it is interactive as the user's one (see Figure 6). In an online match this widget faces the user, and of course any interaction is disabled, as the opponent's status is updated by the opponent itself on his device.

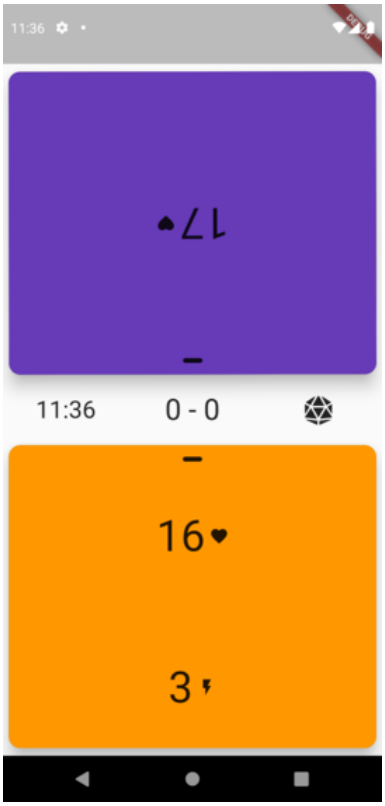

Figure 6. Life counter page - offline match

3.2.3 Profile page and Deck management

Profile page holds a summarized view of user's statistics, providing an easy way to evaluate its performance over the time. The *Matches* widget lists the number of matches played in Congrega and the total winrate; *Current Deck* widget provides a similar view, but based on the current deck in use, shown in the widget subtitle. Finally, *Recent Matches* lists the last 10 matches, showing opponent's username (if was an online match) and the result. Figure 7 shows a possible profile page for the user "Pixel".

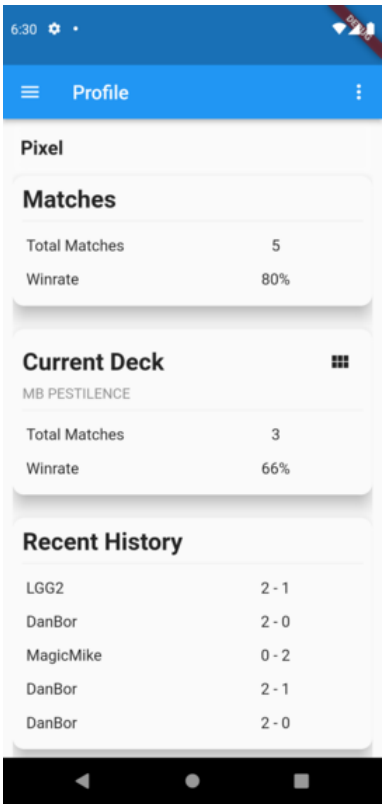

Figure 7. Profile page

Current Deck widget allows the user to manage its deck collection: tapping on the icon placed on the top-right corner the **Deck** page is shown (Figure 8). Here, the user can insert a new Deck, modify an existent one or delete it. It is also possible to set one of the listed deck as "in use", operating on the *Current Deck* control. "Predifined" deck is the standard deck offered by Congrega, and it's always available after the first startup.

3.3. Technologies and architecture

Congrega's architecture is quite simple: the app is backed by Arcano, a custom backend written in Java, which is accountable for invite notifications and users

database. Arcano has been designed and developed for another course, then it will not be discussed here.

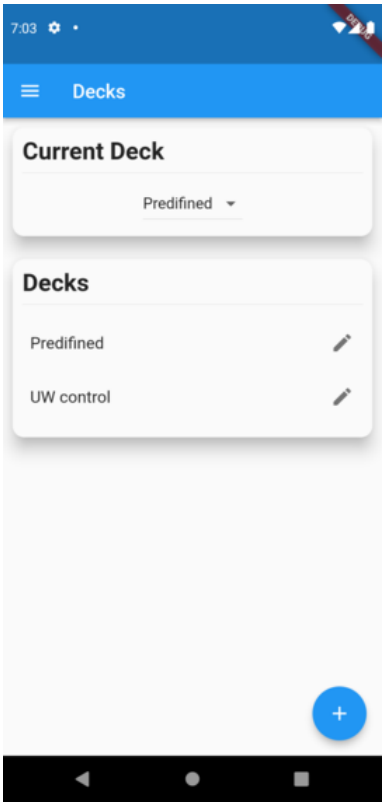

Figure 8. Deck management page

3.3.1 Flutter

Congrega has been developted entirely with Flutter[2], an opensource framework based on Dart, created by Google in 2015. Apps created in Flutter are *crossplatform* in a very wide manner: the same code can be compiled and exported in an web app or in a standalone application which can runs in Android, iOS, Windows, Linux and macOS. Performances are absolutely exceptional, considering that Congrega reaches 60fps in a LG G2, released in 2014. Flutter is basically an aggregate of several components:

- **Dart platform**, needed for debugging and writing the software. In the debug version a Flutter app runs on a virtual machine, offering the possibility of fast recompilation and making possible "hot reload" where the user can modify the code and expect to see a change on the app **without loss of state**. Once ready for distribution, app is fully compiled in a native executable for target platform.

- **Flutter engine**, which acts like a middleware between the application and the target platform API. It provides support for networking, I/O, low level rendering and accessibility support.

- **Foundation library**, holding the base classes and method needed for working with the Engine's APIs.

- **Design Widgets**, prebaked graphical components, following Material Design and iOS design guidelines.

3.3.2 State management with BLoC

As in many UI framework, a Flutter app's page is composed by a tree of **widgets**. Complex layout can be obtained creating deeply nested structures, that can be computational intensive to rebuild and update when a change occurs. Flutter guidelines suggest several approaches for mitigate rebuild issues, but with complex apps the only solution is to manage efficiently the app's state and rebuild only the needed components.

BLoC (Businness Logic Component)[1] is a popular Flutter package/design pattern that aims to fully decouple UI from Businnes Logic, separating them with a state representation and using streams/events to propagate changes and requests. Figure 9 shows how BLoC operates, the following example could refer to a "Send Message" button.

1. Actions on the UI fire *events*, catched by BLoC.

2. An event is often tied to a *change of state*, which can involve several operations on the Businness/Data layer.

3. When the change of state is completed, the relevant widgets are *notified*, and thus rebuild.

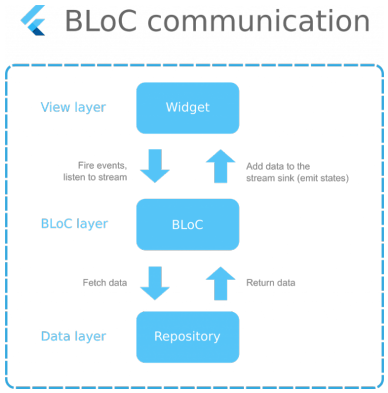

Figure 9. BLoC architecture

BLoC fits very well in the Flutter ecosystem, it has been designed to take leverage of core components such Streams and Sinks, resulting an efficient pattern which scales well with the app complexity. The learning curve is a bit steep, but it's totally worth it given the benefits that carries.

Task	User1	User2	User3	User4	User5	User6
Add a friend	2	1	1	1	1	1
Create a new Deck and set as ”Current”	2	1	1	1	1	1
Start and conduct an offline match	1	1	1	1	1	1
Start and conduct an online match	2	2	1	2	1	1

Table 1. Task attempts

4. Usability tests

Once obtained an usable version of the app, an Android package (apk) has been distributed amoung a 6 people test group[1], composed by different level of expertise with technology and, of course, *Magic: The Gathering*. The group was reunited for a private tournament among friends, so an informal and relaxed environment. Prior the tournament starting testers were asked to install the application and create an account, then a list of task has been provided:

1. Add a friend
2. Create a new Deck and set as ”Current”
3. Start and conduct an offline match
4. Start and conduct an online match

Tasks have been monitored in a semi-supervised mode, providing help only when requested from the user. Task 1 and 2 were executed prior to the tournament start, task 3 was executed by half of the testers in the first round, then the other half in the second round. Task 4 was executed in couple, a player sent the invite and its opponent accepted, starting the match. Table 1 reports the players' attempts for each task.

After the tournament, users were asked to compile a questionnaire about their experience with Congrega, consisting of 14 SEQs (Single Ease Question) where they could express their level of agreement whith the sentence choosing a number between 1 (complete disagreement) and 7 (complete agreement). Results of the questionnaire are shown in Table 2.

Some users also provide a more detailed feedback about bugs and confusing UI elements:

- the deck management button placed in the Current Deck (see Figure 7) widget has been described as ”confusing”, the meaning wasn't clear and it has not been associated to a Deck collection;
- an user didn't perceived the central score widget in the Life Point Tracker page as a button at first;
- two different users found that invite notifications via alert dialog were too much intrusive.

[1]The original group was formed by 8 people, including the author and an iPhone user, both excluded for obvious reasons.

5. Conclusion

Congrega design and development were not an easy journey, in many occasions the project has been paused due to personal issues, and it also lived a couple of pivots: some technologies and mechanisms were abandoned, some functionalities were dropped, and in many cases a massive refactoring/reworking has been required in order to deliver a complete application. Nevertheless, without this difficulties I would never learnt about the design and development process of a real product, which must faces challenges like that. The removed functionalities can be adequate candidates to be implemented in future versions, as long they would be relevant and useful to potential users:

- a pairing system was initially taken into account. This feature, maybe extended in a complete tournament management system, could be appealing to players that love to host events. Some already existent apps offer this possibility (see ”Companion” by Wizards of The Coast), but lack some of the Congrega's features.
- Event creation could be included in Congrega, making easier to create tournaments and reaching potential interested players.

References

[1] Flutter. Bloc - design pattern. `https://flutterdevs.com/blog/bloc-pattern-in-flutter-part-1/`. (accessed: 28.02.2022).

[2] Google. Flutter. `https://flutter.dev/`. (accessed: 27.02.2022).

[3] Google. Material design. `https://material.io/design`. (accessed: 27.02.2022).

[4] W. of The Coast. Magic: The gathering - official website. `https://magic.wizards.com/en/rules`. (accessed: 26.02.2022).

[5] Wikipedia. Magic: The gathering. `https://en.wikipedia.org/wiki/Magic:_The_Gathering`. (accessed: 26.02.2022).

SEQ	User1	User2	User3	User4	User5	User6	Mean	Variance
The application is visually pleasant	6	5	5	7	6	7	6,00	0,80
The application is hard to use	3	3	1	2	1	3	2,17	0,97
Creation of a new Deck is easy	5	6	5	6	6	5	5,50	0,30
The application offers every feature I need	5	6	5	5	5	4	5,00	0,40
Buttons meaning is clear	5	5	5	4	5	4	4,67	0,27
Challenge a player in a online match is clunky	3	2	1	3	2	2	2,17	0,57
The application is snappy and fluid	6	6	7	6	6	6	6,17	0,17
The application is really helpful in an offline match	7	6	6	6	4	7	6,00	1,20
Application features are hard to discover	4	3	2	2	3	3	2,83	0,57
Match stats are well organized	5	5	6	7	5	6	5,67	0,67
Search and add an user as a friend is easy and intuitive	4	6	6	6	6	5	5,50	0,70
I've had an hard time while setting counters	2	1	2	1	2	2	1,67	0,27
Online match notifications are annoying	3	4	5	3	5	5	4,17	0,97
I'm overall satisfied	5	6	7	6	7	6	6,17	0,57

Table 2. Results of SEQs