

# The Augmented Case of Murri

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## Keywords

Augmented Reality, Case of Murri, Escape Room, Graphics, 3D, museum environment, storytelling, gamification.

## Abstract

In this paper, we will describe our project: The Augmented Case of Murri. Starting from a brief introduction about what it is and an analysis of the state of art both from a technological, cultural and economic point of view that helped us going to the right direction while developing our ideas, we will go deep into the steps of its creation, both from the historical research and technical point of view, the development of the storytelling and the motivation behind both the model (Escape room) and the technologies (Augmented reality) considering not only our demographic target (18-30). Moreover, we will try to adapt these technologies and models into a museal environment, with the final aim of linking pop culture with cultural institutions.

## Introduction

Our project consists in the creation of an "escape-room-like" space made by four panels that will reconstruct the crime scene of one of the most famous murders that happened in the city of Bologna: the murder of Francesco Bonmartini that involved most of the member of the Murri family (in fact it is also known as the Murri Case). The user will be required to find hints scattered into the rooms by looking at the panels through their own special "detective lens" which would be their smartphone. In fact, the whole experience will be based on the use of a web application in order to use a smartphone camera to trigger some elements of Augmented reality (images,

texts, 3D models) inserted directly into the panels through the use of markers. During the game, the user will be given information about the context in which this murder happened and will be provided with digital reconstruction of artefacts of that period (the panels themselves are reconstructions). Additionally (s)he will be challenged by some puzzles that will require logical and critical thinking to be solved.

Our aim is in fact to respect historical truth where possible (of course there will be some minor changes made in order to make the game flow better).

After spending most of the time examining the room, we also gave the user the possibility to interact with the characters themselves involved in the Murder, revealing more hindsight about their personality and psychological traits, all taken from reliable sources quoted below.

In the end, the user will be able to make his choice, according to the clues that have been found and the witnesses' interrogation, about who committed the crime. After the choice, an explanation will be provided on the motivations of the killer and the user will find out if s(he) has won or not. Soon after death, there will be one last branch of information that will give the user an idea about what really happened during the process, with the development of the characters after the murder and the official accusations that led to the imprisonment of the alleged killer(s).

The sections below will explain in depth these aspects of our project: Escape Room model and state of art in the museums, AR Use and state of art, historical context, the drawings, panels, markers (with a description

of our AR system), 3D models, storytelling and our demo implementation and some conclusive words.

## Escape room model: motivations behind the choice and state of art

In this section of the paper we will explain why we have chosen to use escape rooms as models for our project, how we differ from “traditional” escape rooms and how to link museology to this game format. By doing so, we will analyze the state-of-art about Escape Rooms in museums, with a particular interest in themes, pricing, duration and number of “users” that can access the room at the same time.

The concept behind an escape room is that the user(s) are locked inside a closed space and need to escape in a certain amount of time. Their imprisonment context is often linked with a mystery and generally the clues to resolve this mystery, which are usually scattered inside the rooms and obtainable by playing logic games and puzzles, are also the key elements that will help them to escape the room. The escape rooms trend has been growing steadily with no sign of stopping anytime soon. Only in the United states the number of existing escape rooms has grown from 22 in 2014 to more than 2000 in 2018<sup>1</sup>.

The main target of escape rooms are the young adults (18-30) and, this target is the one that, over the last decade, has shown the least interest in visiting museums<sup>2</sup>. These statistics are what led us to choose this format in order to try to attract the attention on this particular audience. Museums are a medium to transmit culture and we believe that, with some adjustments, the escape room model can be used to adopt a cultural trend into a cultural institution.

The target audience is nowadays used to receive information through experiences, and not to just passively observe items.<sup>2</sup> Although we believe there can be a connection between pop culture and cultural institutions it’s important to not sacrifice information just for the sake of popularity and to preserve the role of a Museum in our society, which is different from a Game Centre.

To achieve this goal, we decided to focus on the theme of our installation, which is not based on a real reconstructed room but uses panels with printed items to represent the furniture of a room (Explained in dept in Sect. X), enhanced through augmented reality activated by markers (Explained in dept in Sect. X and X)

We decided that we wanted to find something related to Bologna in some way, because, moreover, the Emilia Romagna Region’s Capital is the home of many students either from Italy or abroad, so it’s the perfect city for our demographic towers and the theme needed to reflect at least a part of its history in order to be appealing also to the museums that may use our installation in the future.

Because of the nature of our theme, the “Murri’s Murder Case” (Explained in dept in Sect. X), we needed to make some adjustments to the Escape Room model. The users will not need to “escape” the room but to interact with it to solve this murder mystery. Additionally, in traditional escape rooms, clues are created first and the space is a reflection of the clues disposition and it is created afterwards. In our case, instead, the clues and the space were created almost simultaneously because we already had the sources of the historical investigation and the images that recreated the room, so these two important aspects (space and clues) influenced and depended on each other without one prevailing.

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<sup>1</sup> (Mallenbaum, 2018)

<sup>2</sup> (Schaffman, 2017)

It was important to balance the historical truth and the puzzles and clues scattered in the room and to make the panels themselves a reconstruction of it like a proper museal item. Moreover, we decided to insert external resources in the form of a digital reconstruction to increase the cultural content of our game. The clues themselves can be seen as a catalogue for our exhibition (Explained in dept. in Sect X). As we will see in the analysis of the state-of-art escape museums application, the theme not always reflects in some way the museum in which the room is located, causing incoherence and inconsistency in the museum itself, and often it is not historically accurate.

As for the state-of-art for the escape rooms in museums, we looked on the web to find examples on existing ones to study their business plan, themes, max number of participants and duration of the experiences. We decided to focus on these exhibitions:

1. “Back to the Fossils” – Museum of Ottawa<sup>3</sup>
2. “Framed” – Museum of Ottawa<sup>3</sup>
3. “Escape Room” – UI Museum of Natural History<sup>4</sup>
4. “Prison Escape Room” – St Neots Museum<sup>5</sup>
5. “Escape Room” – Israel Museum<sup>6</sup>
6. “Red Scare” – Augusta Museum<sup>7</sup>
7. “Murder At The Mill – Augusta Museum<sup>8</sup>
8. “Fonthill Castle Escape Room” – Mercer Museum<sup>9</sup>

## 9. “The Merchants’ Vaults” – Museum of Norwich<sup>10</sup>

The price range for the escape room per person varies if we look at each one of these escape rooms. Below you will find a table (Table 1) that summarizes our data about prices<sup>11</sup>:

Average price p.p.	Price Mode p.p.	Highest Pricing p.p.	Lowest Pricing p.p.
24,80€	30€	37,5€	9,85€

**Table 1.**

Considering that these tables represents prices from countries with different Pro-capite GDPs, we decided to normalize the GDPs as if all the escape rooms took place in the nation with the highest GDP and recalculate these prices in a fair way (Table 2):

Average price p.p	Price Mode p.p.	Highest Pricing p.p	Lowest Pricing p.p
28,46 €	30€	37.5€	9,85€

**Table 2.**

<sup>3</sup> <https://nature.ca/en/plan-your-visit/whats/escape-museum>

<sup>4</sup> <https://mnh.uiowa.edu/events/ui-museum-natural-history-escape-room>

<sup>5</sup> <https://www.stneotsmuseum.org.uk/escape/>

<sup>6</sup> <https://www.funinjerusalem.com/event/escape-room-israel-museum/2017-08-06/>

<sup>7</sup> <http://www.augustamuseum.org/RedScare>

<sup>8</sup> <http://www.augustamuseum.org/MurderAtTheMill>

<sup>9</sup> <https://www.mercermuseum.org/event/fonthill-escape-room/>

<sup>10</sup> <http://historymysterygame.com/escape-game-museum-of-norwich/>

<sup>11</sup> some sites vary the price depending on the participants, granting some discounts based on the number, in those case we choose 4 people as the standard, so the price per person is that value/4. For our calculations, we considered only one entrance per museum (museum with multiple escape rooms will have only 1 calculated in case the price is the same)

Ultimately the price of the exposition will depend on the museum, but we estimate a price considering these factors:

1. Our experience has a virtual part that makes it less expensive in the sense of building it
2. GDP of Italy
3. Our target (young adults – university students)

Our proposal would be 10€ p.p.

We considered offering the entrance for free but considering the duration of the experience and the max. number of people that can play in a “team” (written below) we believe that without a booking and a price there would always be a queue in the museum to try the attraction, ruining the experience of visiting a museum. Instead, by booking before, people would get their scheduled time to avoid any queue at all.

We did not include a table for the duration of the experiences because almost all of them have a time limit of 60 minutes with just one shorter with only 45 minutes. Our demo experience implementation lasts around 30 minutes, but the full experience can be completed in around 45 minutes, so we chose a time limit of 60 minutes to make sure that even with some difficulties, our game can be easily completed.

For what concerns the n. of participants, considering that our web app can be accessed by only one device, a maximum of 3 people that share the same smartphone was the correct number for us. In a future implementation, we may consider synchronizing devices in order to have multiple people investigating at the same time.

The themes for these escape rooms can be divided into these three categories<sup>12</sup>:

- Escape rooms incoherent with the museal environment / context in which they are put in or “Escape rooms for the sake of popularity”
- Escape rooms included in a context coherent with their themes but with no historical truth or “Museum that becomes an escape room”
- Escape rooms included in a context coherent with their themes and with historical truth, used to display museal items and to give the users real notions or: “Escape room that becomes a Museum”.

We aiming to get our project in the third category, we expect it to be included in a museum or (temporary exhibition) of history that focuses at least a part of it either in the crime history of Bologna or in the history of early 20<sup>th</sup> century.

## Implementation of an Augmented Reality System

In this section, we will discuss about our decision to take our installation to the next level by including augmented reality with a brief reflection about augmented reality state-of-art.

As we already written in the previous section, we want to involve the user in the installation, and to do so we decided to implement augmented reality in our project. Augmented reality is, in fact, the technology that permits to enrich our “reality” by adding additional layers to it, that can vary from simple text to images to 3D models (all

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<sup>12</sup> We decided not to reveal which escape rooms we labelled for each of our categories as a matter of respects regarding the museums. We are not here to judge the

work of other people, it’s just to differentiate the levels in which an escape room and a museum can coexist and influence each other.

included in our project). We believe that with AR “the user experience is thus transformed from relating different pieces of information to one another to ‘living through’ the narrative”<sup>13</sup>. Moreover, we needed to give life in some way to our panels that otherwise would have felt flat. Finally, by using AR we fill the gap between our web application and the physical panels, because by triggering it the user is able to get the clues needed to advance in the levels and solve the mystery.

To summarize, we exploit AR like an instrument that not only can “add value”<sup>14</sup> to our installation but also can be used to provide solutions to our problems.

We cannot really call augmented reality as a new tool, because it has been existing for many years already, but the idea of AR is still new to people and can still work as an “element of surprise”<sup>15</sup> and we hope that this addition will lead more people to try our installation, as AR is popular in our target because of apps that integrated it like Instagram or Snapchat.

From a museal point of view, “many artists have started using this technology in semi-permanent exhibitions.”<sup>13</sup> But we wanted to distinguish from most the augmented reality exhibitions because they usually require visors which can be both disturbing for the user, as a matter of comfort and quite expensive for a museum because of the maintenance that they require in case they get broken. For this reason, we decided to exploit the nowadays spread use of smartphones. In particular, their camera function and their ability to navigate in the web<sup>16</sup>. This will also help the user by giving a

certain sense of familiarity because they are using their smartphone. The possibility to loan a smartphone from the museum can be explored as well but we do not expect to become a big demand, as almost everyone owns a smartphone.

Because we previously cited maintenance and possible breakings of items used (visors), we can say that the possibility to add reconstructions of artefacts with AR resolves completely the use of real existing artefacts that may be precious for the museums and would be dangerous to be put into the hands of the users, who could break them and would go against the mission of the museums to preserve and protect their artefacts.

One of the possibilities that we had to implement AR was to use ROAR, a web platform to create augmented reality and markers directly on the web and then visualize them with your smartphone camera<sup>17</sup>. The problems that we had with this platform is that it requires the user to download and use the ROAR app, that may not be compatible with all devices and operating systems. We decided to not make any mobile application for these reasons regarding compatibility. We believe that a web app that can be accessible just with a browser can avoid these problems of compatibility as long as its respects the different browsers of different smartphones<sup>18</sup>.

Finally, we found a library, AR.js that was able to provide with all the tools needed to realize our projects without having to create a smartphone application (Explained in depth in Sect. X).

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<sup>13</sup> (Bimber, 2005)

<sup>14</sup> In regard to this, Nawaz Mohamudally talks about this concept behind the use of AR: “Inspiration: involves an accurate understanding of a problem or an eventual product where AR can add value.” (2018)

<sup>15</sup> (Mohamudally 2018)

<sup>16</sup> Although it is possible that smartphones may not have a connection, the museum could host local servers with our web app in order to make its use possible even

for users that do not have data, but there is also the possibility of granting real wi-fi to visitors to avoid this problem.

<sup>17</sup> More information on <https://theroar.io/>

<sup>18</sup> The difficulty of managing the compatibilities issues between operating systems regarding smartphone application is anyways extremely more complicated than create a almost-any-browser-compatible website.

## The Case of Murri: an historical introduction<sup>19</sup>

In the morning of 2<sup>nd</sup> September 1902, a strong and disgusting smell was emanating from a palace in the center of Bologna, called Palazzo Bisteghi. It was Francesco Bonmartini's home, a Count who came from Veneto to Bologna to live with his wife, Linda Murri.

That terrible smell aroused the suspicious of the porter of the palace, Teresa Cicognani, who at a certain point decided to ring Bonmartini's bell, but no answer came in. Something had happened in there. The porter decided to call one of the members of the Murri's family, since the Count had no relatives in the city. The first to come was Tullio Murri, Bonmartini's brother-in-law. Linda was in Venice with her children in that moment, this is why she was not immediately warned.

Tullio, once he arrived at the palace, showed off a great decisiveness and a very clear mind. He called the police and ordered them to force the lock of the door and to penetrate into Bonmartini's flat, without any hesitation.

It was a brutal show what appeared at the eyes of Tullio, Riccardo (Tullio and Linda's uncle) and of the policemen.

Bonmartini was killed violently. His body fell onto a corner of the antechamber of his room, completely dead and defenseless. Thirteen cruel stabs all around the corpse. The fiercest wound was the one that pierced his breastbone from side to side. The deepest at the level of the hyoid bone and of the larynx. They were a continuous linear solution with sharp margins, 22 mm long, in the crosswise

direction, from the bottom to the top. The cuts were very precise and were inflicted according to a logic order: the first to his heart, then the neck, to avoid him to cry out. Maybe an expert hand.

A very great violence, but not messy clothes. Not lacerations or folds, only crisp cuts and a very advanced state of decomposition.

Bonmartini was passed away in the day of his 33<sup>rd</sup> birthday. Before his death, he travelled on his own from Venice to Bologna. He was alone also in the day in which his body was carried to Carzavere, his native town, to be buried in the family tomb. Only a crown of flowers given by Murri Family, completely missing, to take him to the station to go away.

In the afternoon on 2<sup>nd</sup> September, the police investigations started. The first certainty was that a member of the family of the dead man was culprit. In fact, there was no trace of break-in on the doors and locks of the palace and everything was almost tidy. The killer had to have the keys of the flat. Not a thief committed the crime.

They began to investigate among the Murri's Family. Every one of them had a reason to kill.

The head of the household, Augusto Murri, was well-known by his fellow citizens. He was an illustrious and upstanding man. He was the father of a respectable family belonging to gentry, master of science, clinician and professor at the University of Bologna. He was considered one of the most eminent exponent of a secular morality and of a culture that was being scratched by an unstoppable breakdown. But he was still ready to fight for the values in which he believed. His

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<sup>19</sup> Since the story of the Case of Murri is so difficult and complicated because it is made of a lot of versions, intrigues and withdrawals and even now we do not have an official version of the facts, we decided to base our

storytelling on only one source, to make it clear and homogeneous, without any contradictions. (Babini, 2004)

scientific and progressive culture trusted in the reason as an instrument of moral and intellectual evolution of mankind. During his whole life, he carried forward the ideals of Positivism and Democracy, the predominant cultures in Italy at the sunset of XIX century. But maybe, in a flash, he could have lost his light of reason and killed Bonmartini. In fact, he had had a friction with the Count a little bit before his son-in-law's death. He did not tolerate the fact that the relationship between his daughter Linda and his husband had long since cracked, and this is why he did not accept Bonmartini as assistant in his practice. "For personal reason between him and me" he said. This fact provoked a deep frustration in the Count. Bonmartini was an exponent of the nobility and its values, as the faith in Catholic creed, but he was very attracted by the world of gentry, whose strength and modernity he perceived. This is why his great desire was to become an assistant of Augusto Murri, one of the most important doctor considered a luminary of medicine in that moment. But his dream felt to pieces.

Bonmartini's wife, Linda Murri, could be a possible culprit, as well. She was an enigmatic woman. She was considered a "modest little woman of the house" with a strong maternal sensitivity, but her great emotional control and her magnetic glance made her stand out. When she was young, she was in love with Carlo Secchi, one of Augusto's pupils, but her family banned her from marrying him because of his age: he was twenty years older. After the marriage with Bonmartini, she kept on meeting Secchi in a flat rent for their love conventions. Their meeting did not seem to come to an end.

When Bonmartini passed away, Secchi had been able to establish himself as one of the best otolaryngologist in the city. At Istituto Rizzoli he had known a nurse, called Tisa Borghi, and decided to hire her as assistant and servant, after being her lover. Tisa Borghi was

a very cold woman, used to keeping herself locked in her own secrets. But she was not reluctant to declare her hatred towards Linda. Maybe this hatred was so strong to push her to be involved in a murder.

Another possible guilty man could be Linda's brother, Tullio Murri. Tullio was a very uncommon character. He was a pleasure-loving man and he spent his life between woman, cards and politics, taking up the socialist faith. Similar to the main character of "L'innocente" by D'annunzio, who has the same name, his nature was impetuous. He did not judge Bonmartini as a good husband for his sister. He considered the Count psychologically insensitive and for this reason Linda was threatened and had to be defended against everything. The fact that Bonmartini had a lover aggravated the situation and the instability of Tullio's personality became more and more clear.

The process was long and complicated. One by one, the members of the Murri Family were accused to be guilty and every one of them provided a different version of the fact. But when the investigations seemed to be in a dead end, Tullio, accused even by his father Augusto Murri, confessed to be the culprit. Tullio wanted to do away with Bonmartini. As the D'Annunzio character, he supported the dignity of a homicide conceived as a Prometheus virtue.

Therefore, the man who committed a crime was the son of Augusto Murri, that professor who was envied for his brilliant mind and fought so strongly to modernize and secularized the culture and the institutions. As the Catholic journal "L'Avvenire" wrote, the evil came exactly in the home of who claimed to regenerate the population through rational and scientific education.

## Historical relevance of the Case of Murri

The case of the Bonmartini's murder was very relevant from different points of view.

The first thing to say is that it can be considered the first Italian media event ever (Figure 1).



Figure 1: First article about the Case of Murri, published on L'Avanti newspaper.

It was a crime made of love, passion, treason, poison, and its setting was the charming middle-class world with its vices and its few values. All these kinds of elements captivated the most part of the population and people talked about this crime in coffee bars, all around the streets of the city of Bologna, in which it happened, and in the salons, as an occasion of recreation from ordinary days and amusement. What really intrigued and

attracted people was being able to penetrate into a family of a very brilliant and envied social class, the Middle-Class, reading everything about the investigations on the journals that went around the city.

The case was so followed, analyzed, discussed and commented that crossed the national borders and arrived also in France and in England, where the murder was strongly envied for its power of attraction, but the Italian population was rigidly criticized, because it was considered the most inclined to believe in evil and it was characterized by an inadequate sense of justice.

The news about the Murri's Family intrigues and investigations became a fixed appointment for all the readers of every journal of any political party, who were so impatient to come to know all the hidden sides of all their unsuspected citizens' lives. In this way, one by one, the members of the family became a protagonist of a new love affair, of an obscene incest or another absurd scandal.

A real editorial competition had raised up: journals got richer and richer of gossips and full of photos of the characters, of the settings of the murder, and illustrations (Figure 2), even with a satirical aspect enlighten.

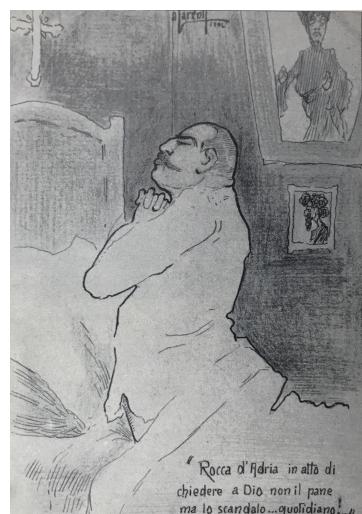


Figure 2: postcard with a satirical illustration that depicts the director of the Catholic newspaper "L'Avvenire" during the period of the Case of Murri.

Even in the investigations, newspapers played a central role, even preceding the policemen in discovering new important details to solve the case. The press became so outrageous to attract the attention of the Vatican, which scolded the editorial staffs for their invasiveness, ordered to avoid the details of the case and gave new guidelines on how to deal with that crime news: they had to consider the fact by a more general point of view, which would be more useful and educational.

However, that captivating family intrigue was not only an occasion of spending time on rumors, but it had a very higher potential. That judicial case was an opportunity for Italy to become aware of the disruptive and disorienting function of the press. Moreover, it was particularly suitable for becoming an optimal vehicle of ideological messages and political leanings toward a public vast and above all diversified by a social and cultural points of view. In fact, for newspapers that murder immediately appeared as a moral and ideological prompter, a mean of political propaganda and an instrument of modelling, developing and orienting the public opinion, whose role and function were studied in those years.

By the ideological point of view, it represented a struggle between Rationalism and Catholic ideology. The journals that supported the Catholic party violently attacked science and its attempt to regenerate all the generations all around the world by means of a new rational and laic education. In Catholic's opinion, it was not a coincidence that an evil homicide like that happened in a family whose head household, Augusto Murri, was the master of the scientific truth. He believed in the guidance of reason and carried on a secular morality, claiming that scientific truth corresponded to moral truth, but he himself witnessed the falsification of his theories in his family environment. So, the murder of Bologna demonstrated that the laic and

positive education, considered a mean for containing and controlling the physical and moral degeneration of the nation by the scientists and positive intellectuals, produced everything, but immorality and criminality. This is why the Catholic press wanted to take on the role of defender of justice. Their task in social life and in the institutions, was necessary.

The attack hit also the Socialism, another one of the ideologies which characterized the second-half of the XIX century. Catholics showed to the working class that their political supervisors, who were atheist and materialistic, did not defend their economic interests and their dignity as a class, but they supported the corrupted and parasitic Middle-Class. So, they oriented the public opinion toward a very strong contempt and hatred addressed to the bourgeoisie, considered too elitist. The fact that the killer, Tullio, was a socialist leader, his father one of the most important exponents of Positivism and the victim a believer man, made the Catholic thesis more incisive.

The Bonmartini's murder went down in history also for another reason. It was an intense and vivid example of the popular literature of the first half of '900. It was called "Romanzo di Bologna". It had all the features of a popular novel of that time: a political background, some multi-colored characters, flooded personalities, regional tempers, political memberships, interpersonal relationships. Most of the plot was written by the newspaper and attracted so many people to consider this crime the first media case in the Italian history.

The birth a new type of language was related to the interest of journals in this crime: the language used for the crime news became completely different from the one used for any other article. It was independent from the ideological choice and particularly raw, cruel and realistic.

Moreover, people attended a very great but silent revolution linked to this fact: all the funny and captivating episodes of the “Romanzo di Bologna”, published on the journals of any political party every day, make the population to access to the reading and, as a consequence, to the spreading of literacy rate.

Therefore, the event involved the public opinion so much that it became the most famous and discussed judicial case of Giolitti’s age. This happened because it was treated as an object of ideological and political abuse that turned into a very evident fact, especially in the newspapers articles. The Murri case accused many of the values that have been the backbone of the process of nation’s growth and development. Positivism, Socialism and Rationalism were coming to an end and, by the time, the XIX century breakdown was inexorable.

All the historical background has to be summarized and explained in an introductory video to show to the visitors of the museum that are going to get in the escape room and start the game.

## Graphics

### *The first step to design the panels: hand drawings*

The corpse of Count Francesco Bonmartini was found dead in a corner of the antechamber of his room, in Palazzo Bisteghi, Via Mazzini (today it is Strada Maggiore), in Bologna.

Since we have an original illustration of the crime scene (Figure 3) itself and a faithful and accurate description of it, derived from some procedural documents used as witnesses, we decided to reproduce it as it actually was to design four different panels (Figure 4, Figure 5, Figure 6, Figure 7).



Figure 3: Original Illustration of Bonmartini's room.



Figure 4: The Door Panel



Figure 5: The Bed Panel



Figure 6: The Table Panel



Figure 7: The Window Panel

The aim was to create a real room made of four cardboard-walls (Fig. n.), in which any museum visitors cannot only observe the crime scene as it was found out, but also interact with it by means of a system based on augmented reality.

They will try to determine who was the culprit of Bonmartini's death starting from

some clues hidden in the room and questioning the characters involved in the murder. In this way, the visitor will be completely captivated in the atmosphere of a real crime, playing the role of a true detective and surrounded by a background that simulates the real setting in which Bonmartini was killed.

The first step to re-create the environment in which the murder happened was to gather some information about the conditions of it when the corpse was found. It is not possible to visit it at the moment, so we read some documents that describe it in detail in order to obtain a historically valid reconstruction.

In Bonmartini's room, everything seemed to be quite in order: its entrance door was not forced, every drawer was perfectly closed, all the objects in their place, no trace of thieves anywhere. It was as if nothing had happened. The hypothesis of the theft or armed robbery had to be rejected.

As you got in the room, there were a basket with a little bit of rubbish which no one had thrown away in the days before, and a well-ordered bookcase in which some books by eminent authors were kept, including Gustave Flaubert's ones, the French writer really loved by Linda, the Count's wife.

In front of the door, there was a bed which was not made up, as if someone, after getting up in the morning, had left it undone and went away in a hurry. Among the sheets, a pair of almost new women's panties were found. The fact that, next to the bed, there were also a half-empty bottle of Champagne, whose expensive and refined brand was Gancia Canelli, and two glasses, as well, suggested that an alleged lover could be involved in the murder. Another two proofs supported this hypothesis: a hair in a chamber pot, which was in front of a window that overlooked Bologna, and a note (Figure 8) that was found in one of the night stand drawers. It was written by a woman, whose name was not entirely reported,

but only its initial letter was known: B.

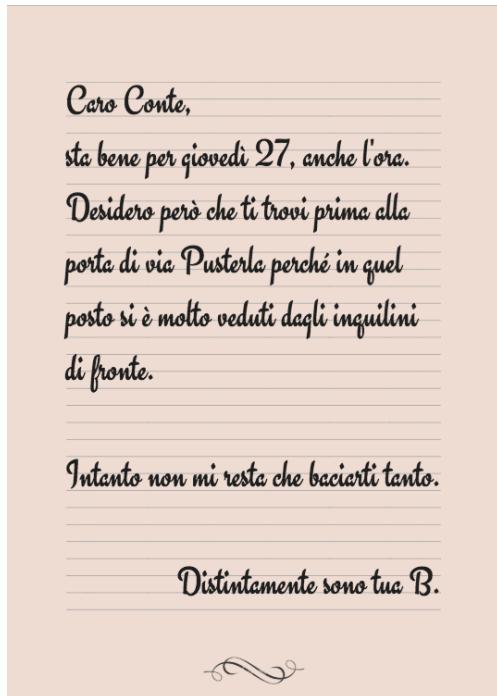


Figure 8: Note of Bonmartini's lover

It said:

Dear Count,

*It's fine for Thursday 27<sup>th</sup>, even the hour.*

*However, I would like you to be at the door of  
Via Pusterla because in that place you are  
seen so much better by the tenants that are in  
front of you. Meanwhile, I just have to kiss  
you a lot.*

*Distinctly yours, B.*

But we know that, speaking about a crime, the red herring is a fact of reality. In fact, another object was present in that room and played a fundamental role in the resolution of the murder: a wooden trunk in which two notes (Figure 9) were found out.

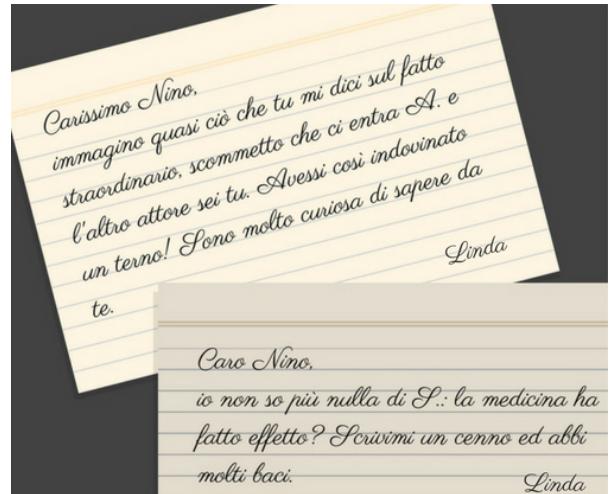


Figure 9: Linda's letters to Tullio.

They were written by Linda to Nino, the nickname of her brother Tullio. The first one said:

Dear Nino,

*I almost imagine what you have told me about  
the extraordinary event, I bet A. is involved  
and the other actor is you. I had guessed a  
terro! I am too curious to know from you.*

Linda

Dead Nino,

*I do not know anything about S. anymore: did  
the medicine work? Write me a note and have  
many kisses.*

Linda

All the notes that were found are reported in Italian in the application that has to be used to interact with the escape room objects, even if English is the language we chose for it. This because we wanted to show their real content, since we treated them as museum objects. To solve the problem derived from the use of two different languages, we decided to insert English subtitles to translate the Italian text of the notes when they are visualized in the application.

The final object reported in the

reproduction of the room is a vial of poison, found in the basket at the entrance. This is the object that unlocked the mystery of who killed the Count. In fact, there is a meaningful link between the note written by Linda to Nino about a strange “medicine” and the vial thrown in the bin. It is not a case that the visitor will find the vial at the end of the game. Even in the reality, it was noticed in a dead end of the investigation and solved the case.

Starting from a recapitulation of the condition of the room when the body was found, we designed the plan of it (Figure 10), trying to respect the original position of the door, the window and the furniture.

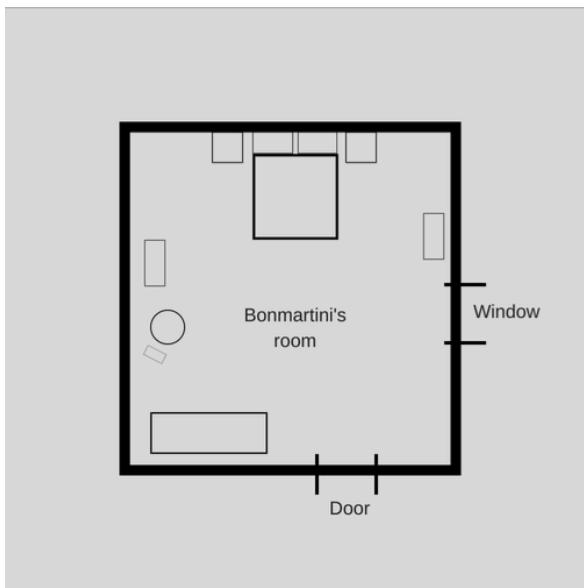


Figure 10: Plan of Bonmartini's flat.

Then we filled out a list of all the objects and furniture present in the room we wanted to reproduce for the panels:

- A door with a decoration in glass and golden metal;
- A basket with inserts in golden metal;
- A bookcase full of books, some of which characterized by a number (that one that corresponds to the position of a specific book in a collection) and the initials of an author;
- Two chamber pots;

- A bucket;
- A jug;
- A vanity table with a book, a hairbrush and a pair of nail scissors on;
- A window;
- A curtain;
- A wooden trunk;
- A landscape of Bologna;
- A not made up bed with a pair of pillows;
- Two night stands;
- Two lamps;
- A recliner;
- A small table with a pair of glasses, corkscrew, a champagne bucket and an open bottle of champagne on;
- A small table;
- A frame with a photo of Bonmartini and his wife reproduced from a real photo of the couple.

In order to design the room and its objects with a personal style, we decided to draw each component of it by hand, often using the “copia dal vero” technique. The result is a cartoon style characterized by realistic details.

Some examples of drawings are below (Figure 11):

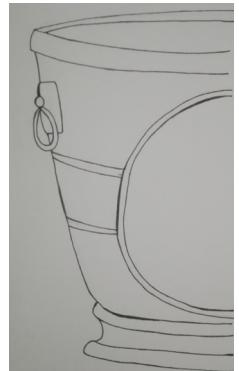


Figure 11: Hand drawings of a glass, a Champagne bucket and an half-empty bottle of Champagne.

## *The second step to design the panels: vectorized drawings with Inkscape*

Starting from the hand drawings, we processed them with the computer software *Inkscape*. First, we vectorized the drawings, then, dividing them into sections, we assigned to each some colors and shades. Exporting the images in .SVG format allowed us to zoom in and out without losing the images' sharpness and details.

Our approach was to create each element standing alone. Once all the furniture's piece was done, we created a single .SVG image for each wall of the room, resizing opportunely each item according both on realistic size dimensions (scaled) and markers minimum size requirements for the 3D model's activation (Figure 12).



*Figure 12: The process from hand drawings to vectorized images.*

## *The panels: a way to recreate the room walls*

The lossless scalability (data compression) of the images with vector format was fundamental for the creation of the panels: the dimension of each of the room "walls" in our prototype is 150cm high per 200cm wide, so it required sharp images for a big printed format. The role of the panels is even more important if we think that they had to historically represent as much as possible the room's

objects and features. But, we need to point that some furniture in the panels are just decorations or game's on-purpose tricks for the development of the game-play.

So, the panels became the only physical ("touchable" in its broader sense) items with which users can physically interact. They represent the actual walls where the historical murder has been committed and so, they are the concrete basic from which the whole installation starts. So, the panels can be seen as the physical starting point of the application: they are the static tool thanks to which we could recreate firstly a sort of illusion for the users to be in the murderer's place and then, the dynamic and interactive features of the online application.

The panels have not only the practical function of being the base for the development of resolving storytelling's clues, but they have also a decorative function. Regarding this aspect, we need to highlight that our printed four panels have to be considered as prototypes. This means that they represent as much as possible the crime scene's real aspect (realized from the already mentioned illustrations of the time) (Figure 3), so we can show how the room will look like and how the game will work, but it is not actually fully "complete": in the real installation, the panels images will be more detailed, with the addition of objects (but, unnecessary for the storytelling's aims) and decorations, just to give some ornamental features.

But at this point, we need to make a digression: why did we choose panels instead of creating an actual room with true furniture? First, recreating the crime scene in a museum's real room requires some structural adjustments, to represent realistically the crime scene. This means that some real changes are needed in the actual museum's room: this is a permanent change in the real room's structure, as well as being a quite expensive process. Furthermore, going deep into this aspect, an

accurate representation of the crime scenes' furniture as real items can be a tricky process. First of all, the only source from where we can reconstruct these objects is the illustrations (Figure 3). This means that we did not have any other way to collect more information, also considering that Murri's bedroom was an actual crime scene that has been detected and looked over for the real legal investigation, so we did not have an actual evidence.

Beyond that, panels allowed us to create a room that is free of structural constrains: this "fake" room can be easily moved and placed almost everywhere, then it can be reproduced without needing any permanent change in the building structure.

Moreover, the dimensions of the panels are completely definable. Depending on the museum's structural space restrictions, the dimension can be appropriately set. Starting from the minimum reasonable scale (our printed version 150x200cm), it can be enhanced 'till the real dimensions of the actual Murri's bedroom (1:1 scale), or even more.

Creating a room made of four walls cardboards has an additional asset: after each experience, there is no need to tidy up the space.

In conclusion, we considered these four panels as a simple, practical and cheap solution. Their flexibility lets them be used both as a permanent or temporary exhibition.

## Marker: AR.js<sup>20</sup>

The real connection between the panels and the application is based on the markers. Each of them is a squared .png image. Their structure is made by a white external border, an additional inner black frame, and the actual image that can be changed as appropriate. The marker framework we used is given by AR.js

library (Figure 13) that provided us the .png marker image (AR.js "marker generator" section permitted to generate a pattern with our own image) and a code pattern to implement them in our app.

The double black and white frame can be quite difficult to hide. The thinking behind was to try to make them full members of the decorations, trying as much as possible to mask them. As an example, the Champagne's marker has been adapted becoming the label of wine, it represents a sort of "plaque" carrying the champagne's name (Gancia Canelli).

As an additional important aspect to report regarding to the markers adjustments on our panels, we have to say that, in order to guarantee a stable and proportioned 3D object, each marker has to be at least 7cm wide (as well as high). This was an additional step to consider in our "marker-hiding" strategy process. In fact, the "Gancia Canelli" marker, previously took as an example, is referred to the champagne bottle, but it was too little to contain our marker minimum dimensions. So, we designed an ice bucket containing the bottle: the bucket was big enough to carry the marker, but at the same time it was strictly connected to the bottle, which is the actual object with which the user has to interact for finding the hint.



Figure 13: Example of a marker.

<sup>20</sup> (Etienne, 2018)

## *Why we chose AR.js*

At this point the reader might wonder why did we choose this library? As we said Ar.js is marker-based and for this reason it carries some restrictions in hiding hints in the installation.

On the other hand, AR.js is a simple and valid tool to implement a fluent augmented reality.

First of all, the marker clear structure (the double white and black frame that surrounds the image) is really simple to be recognized by almost all devices with a camera. By pointing with the smartphone at the marker, the related 3D object is displayed almost instantly (Figure 14).

Moreover, Ar.js can be used by the users directly from the browsers (in the GitHub documentation can be found a section where are cited all the browsers supported by the application). We thought that a browser application could be the best option for a casual user: the consumer has no need to download an application which is exclusively on purpose for the game-play.

Furthermore AR.js provides a stable connection between 3D objects and markers. The library allowed us to display 3D objects without trembling, intermittence or unstable dimensions effects.

So, considering pros and cons, we concluded that AR.js was a good choice for our purpose, so that we could provide a solid and fluent application to users.



Figure 14: How the Augmented Reality works in the application.

## **The 3D models**

In this brief section, we will list all the models included in our project demo and the tool used to create them, with a particular step by step description of the creation of one model.

Our 3D models are displayed on the smartphone screen by focusing the right markers at the right time. They are generally linked with a clue or a puzzle and can then be visualized again in a tab of the web application (where it is possible to rotate them to look them from different perspectives).

In total, there are 9 models in our demo: Female panties (with an applied effect that morphs them as if they were touching a surface):

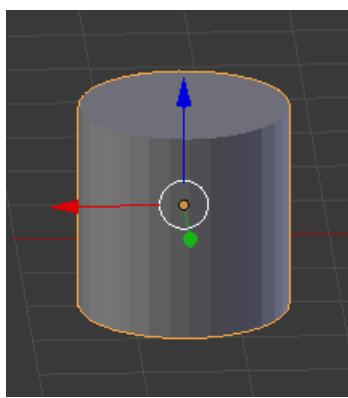
1. One Hair
2. A wooden trunk with lock (closed)
3. A wooden trunk with lock (open)
4. The cadaver of Francesco Bonmartini  
(Only a rendered image is available)
5. A bottle of champagne
6. One door latch
7. A red "T" used in the tutorial
8. A vial of Curaro poison

All the objects were made using the open source software Blender<sup>21</sup>. The textures were either hand-made or downloaded from textures.com<sup>22</sup>. We tried to create simple models because not only a heavy model would slow down a lot our application but also, since they are meant to be seen in a screen of a smartphone (or max a tablet), it would have been useless to create them in high detail.

An example about the process of creation of the models will be given with a step-by-step development of the bottle of champagne model.

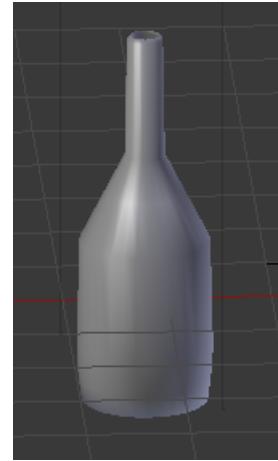
First of all, we needed to have an idea about how the final object would look like, so we looked online for examples of champagne, we also had the name of the champagne from the scene of crime description. Because we didn't find any images of the alleged bottle (considering also that the murder happened in 1902) we used as a model a standard bottle and then applied to it a texture of that particular mark of champagne.

We created a cylinder on blender with the object function (Figure 15) and we started to divide it into sections that would then be modelled to have the shape of a bottle.



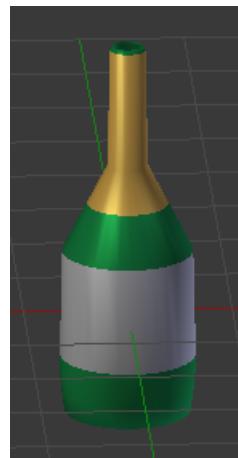
*Figure 15: Cylinder on Blender with the object function.*

To do so, we used the loop cut and slide function (Figure 16).



*Figure 16: Loop cut and slide function.*

After creating the shape, we proceeded to apply some materials and textures to it. Most of them are just normal colors (like the green for the glass and the gold for the upper part) (Figure 16).



*Figure 17: Colors on blender.*

Because we also had drawn the bottle on the panels we wanted to give it some consistency with its drawn counterpart. To do that, we took the images about the drawn bottle and created a texture based on its label part and applied it to the 3D model through the use of UV Mapping.

After that, we played with some parameters of the materials to give them a glass-like appearance and adjusted the light and the model was ready to be inserted into our web application (Figure 18).

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<sup>21</sup> <https://www.blender.org/>

<sup>22</sup> <https://www.textures.com/>



Figure 18: Ready model of a bottle of Champagne created on blender.

## Storytelling

Our web application is used as a Virtual Showcase, which are often used as digital storytelling platforms<sup>23</sup>.

Because the user will need to collect the information and to solve the mystery in a certain order, we can call our approach as an event-based, hierarchical storyboard<sup>24</sup>.

In terms of authoring tools, our application uses character based stories.

Our Storytelling is strictly connected to gamification because “Gamification has been applied to a number of application domains including CH and it is a popular approach to increase the entertainment and thus the motivation factor of users”<sup>25</sup>

## Introduction and Tutorial<sup>26</sup>

As a user, early stage for being friendly with the application, we implemented a short tutorial with all the basic elements of augmented reality features and tasks.

When starting the web-application, appears the first screen representing a little poem, then follows an image that sketches the murder’s background (Figure 19). The last

screen displays a readapted commercial postcard of the period showing the characters with their respective names.



Figure 19: Starting screens of the application.

At the end of this very brief contextualization, the users meet DHDetective, the detective in charge of the inquiry on Bonmartini’s murder, that will introduce and drive them through the hole experience.

One last element that we decided to add was a virtual narrator because “One of the important aspects which enhances the feeling of presence in CH is the interaction with and behavior of the virtual narrators. These narrators should have human-like behaviors, so that the visitors will feel like the virtual narrator that is speaking to them is real and that he/she is in the same room with them.”<sup>27</sup> For this reason, we created the character that the user meets at the end of this very brief contextualization: DHDetective, the detective in charge of the inquiry on Bonmartini’s

<sup>23</sup> (Bimber, 2005)

<sup>24</sup> (Bimber, 2005)

<sup>25</sup> (Papagiannakis, 2018)

<sup>26</sup> For more information (Pagiannakis, 2018)

<sup>27</sup> (Papajannakis, 2018)

murder, that will introduce and drive them through the whole experience.

First, DHDtective introduces himself and guides users into the tutorial steps: the camera-view is activated, and the detective asks the user to point a marker (depicting a “T”) outside the room. The user has to point it correctly, taking as reference a small circle in the center of the device screen and then tap on it. This sequence of actions will activate the markers, in this practical case a 3D “T” associated with that specific marker.

After users have seen the 3D object, the *Clues* button is activated. Now DHDtective introduces them on how to use it during the game. This button is a sort of inventory where are displayed all the clues (so all the objects activated by the markers) of each level. These evidences have to be ordered and put (through a drag and drop function) in a precise order to exceed the level, this is how users will make them hypothesis during the game. In the tutorial users need to collect one object and drop it the appropriate section, so the next tip is showed.

In the screen, there an additional button (*Characters*) that activates another section: here users can look for the characters descriptions each time they may need it. Now users are required to read all the six descriptions to clearly understand who are the actants in the mystery. In this modal, users will find also the button *Interrogation*, but it will become clickable just in the final level of the game-play.

In the screen users find an additional button *Models*, that opens a modal where users can interact (i.e. move, rotate) with all the 3D models collected until that time.

At this point the tutorial is finished, DHDtective congratulates users, tells them to step into the bedroom and asks them to grab the forensic file (printed and positioned in the center of the room), so the first chapter starts.

## CHAPTER 1: *The Robbery*

DHDtective tells users that they first saw the corpse and they noticed that the victim was robbed of his wallet and documents, so their first hypothesis is that this is a case of a robbery gone wrong. Users can look at the forensic analysis where they find some notes related to the status of the body. Now, users are invited to investigate the room to see if they find clues able to validate the hypothesis of the break in.

As the detective suggested, is supposed that users point the bedroom’s door. Pointing at the marker, it will activate the lock’s 3D model and a clue “No signs of break in”. Users can also collect a clue from the autopsy report. From the marker on the printed paper (given to the user at the beginning of the experience), users can activate an image that depicts the 3D reconstruction of the corpse in several positions. It reveals the clue: “Very precise cuts, probably inflicted by a professional”.

Now users need open the *Clues* tab and drop them in the appropriate section: for the purpose of the first level, users have to investigate on the robbery’s hypothesis, so the only strictly connected clue is the one given from the door. Dropping the right clue icon is the only way to exceed the level.

## CHAPTER 2: *Restart*

The chapter starts with DHDtective saying: “Mr. DHDtective: “Well, it looks like we are back to the start. I’ll need you to find more clues to make another hypothesis”. Now users are supposed to investigate the room. In this level users can find the following activated markers (not all of them are required to exceed this level): scientific report (if it has not been investigated yet), chamber pot, bed, champagne bottle, wooden trunk, console.

Pointing the Champagne ice bucket, a 3D-champagne bottle will appear, and the clue is shown: “Open bottle of Champagne”. Otherwise, looking at the console’s marker, it will activate a flat image representing the little message, the clue is: “Message from a Lover”. Investigating the bed, users will find a pair of panties 3D model, with the clue “Female Underwear”.

Moreover, examining the chamber pot, through the 3D model of a single long black hair, an additional clue is discovered: “Female Hair”.

The final activated marker that user can randomly find is the one on the trunk. Pointing at it, there will appear a 3D closed wooden trunk, and by clicking on it users trigger a box where it is required to enter a combination. At this point users may not have this information, but this step is an example of the level’s “fake” clues. The clue may be now discovered, but it will be useful to exceed next levels.

As a conclusion to this stage, users are required to find a connection between the evidences they collected. In the *Clues* section, they can find four empty squares which they have to fill with the four right evidences.

In conclusion, the second level focus is the possibility of a Bonmartini’s affair. Consequently, the four clues are: the hair (from the chamber pot), a pair of panties (hidden inside the bed), Champagne bottle (inside the ice bucket), mistress’ message (put inside the trunk’s drawer).

At this point DHDtective says: “Oh I see, female hair, female underwear, bottle of champagne, a message... It appears that the killer might be a secret lover of the victim.” and “But all these clues, aren’t they a little bit too obvious? Let’s just take another look to be sure that there’s no other possible explanation”.

## CHAPTER 3: Is it all a Setup?

The third chapter starts with DHDtective saying: “Too obvious is always suspicious, as we’ve learned with my first hypothesis of the robbery, someone is trying to create a setup here, the real culprit is smarter than we thought. But no worries, there is no perfect crime, there must be more clues, let’s find them!”.

The activated markers are: the scientific report (if it has not been investigated yet), trunk (still activated), the basket and the bedside table.

Pointing at the bedside table, the user will collect some digital reconstruction of historical artifacts, and DHDtective explains them: “These objects you have found will be placed in the items tab, they are not clues, but may be implicitly related to the crime so you may need to take a look at them”.

Investigating the basket’s marker, users will see that its connected 3D model showing the Curaro’s vial, with its clue: “Curaro Poison Empty Vial”.

If users still haven’t unlocked it, they have to open the trunk by getting the combination.

The combination is hidden through the books stored in the bookcase. As the key to unlock the trunk and solve the task, the user is required to reconnect some hints around the room: through the historical evidences collected from the console, user will find a stamp depicting Gustave Flaubert (Linda’s favorite author). In the bookcase users will find some initials with some numbers. By collecting the numbers associated with “GF” (Flaubert’s initials), users find the right combination to open the lock. The lock and trunk and the mechanism to open are used as an example of story-dependent devices<sup>28</sup> because the importance of the story part:

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<sup>28</sup> (Bimber, 2005)

Linda's obsession with books for no concrete reason finds an explanation in our storytelling, because we are using this mystery to setup our puzzle with the library.

The trunk is now open and it contains a code message from Linda to her brother Tullio. The clue is: "Suspicious Message from Linda".

In the *Clues* section are required three evidences to make the hypothesis: autopsy report, code message and vial. If the combination is correct DHDetective says: "Poison? Very precise cut on the corpse? Involvement of his wife Linda? This is getting too complicated, it's time to talk with some of the protagonists of this story. But when you start the questions don't mention the message, we don't want them to know everything we know. After you finish this interrogation I'm sure you'll be able to identify the killer!".

## *CHAPTER 4: The Final Interrogation*

At this step users are very near to the end. DHDetective says: "Don't tell me you've never done an interrogation before... Well, it's very simple, just click on the characters tab and click on the character you want to talk with, then click on "Start Interrogation", you will see several questions you can ask to each character. Remember, more will be added as you discover new information. Once you think you have the culprit just click on the "Accusation" tab and select the person you think is the killer".

In the interrogation, the device camera is completely deactivated, and in the screen appears a question to which the characters (Linda, Tisa, Carlo, Tullio, Augusto) answer. Users after reading their answers can choose who they think knows more he/she said. Finding out which of them could give more information, by clicking on the appropriate box, users unlock another question that allows

them to better understand and solve the mystery. In the last question Tullio betrays himself, answering with a detail that had never been revealed to him.

At this point, the interactive game is finished. Users have to make a decision: now they should have enough information for the final hypothesis. Users are required to go on the character page and accuse (through the *Accuse* button) the one that, in their opinion, **committed** the murder.

If users are right: "Congratulations! Your guess was right. Tullio couldn't know about the note because during the interrogation you never asked question about it and that confirms the veracity of the note itself. Linda asked him to kill her husband and he presumably did it."

Otherwise, if users are wrong: "I'm sorry, you guessed it wrong! The real culprit of the crime was Tullio! He couldn't know about the note because during the interrogation you never asked question about it and that confirms the veracity of the note itself. Linda asked him to kill her husband and he presumably did it."

## *The Conclusion*

At this point, the interactive game is finished, but in order to maintain the historical truth we ended with what happened to all the characters during the process:

- Linda Murri was involved in the plan of the murder and was arrested. She was released after 1 year for a concession of King Vittorio Emanuele III. He wanted to reward Augusto, who had cured the King's daughter, Mafalda.
- Tullio Murri was arrested on charges of murder. He was reported by his father Augusto, who read a letter of confession written by his son before giving himself up to the police. He

said: "I killed to defend me. This is the pure truth."

- Augusto Murri accused his son to be the killer of Francesco Bonmartini after reading the Bonmartini's letter of confession, but said to have destroyed it. He did not want his wife to find it out. After two years of legal process, he came back to the University of Bologna.
- Carlo Secchi was arrested on charges of being an accessory to the crime. Tisa Borghi accused him to have provided Tullio Murri with the poison to kill Bonmartini. After a period in prison, he committed suicide.
- Tisa Borghi had the possibility of confessing everything in order not to be imprisoned. She told the police that Carlo Secchi prepared a vial of curare to be used to kill Bonmartini. She avoided the jail.

Lacking parts not implemented in the demo.

In our complete version, we would include three more characters: Rosina Bonetti, Teresa Cicognani, Pio Naldi. For Teresa, the housekeeper, we would add a chapter dedicated to how the killer would enter the house by asking a series of questions to the housekeeper: Teresa Cicognani. She would say that she didn't see anyone coming in and this chapter would happen as the second character after the thief hypothesis, because Mr. DHDetective would question how the killers could enter into the room without breaking into it, with an hypothesis that the real culprit had the keys to the room and entered from the main door. Teresa would then witness that she didn't see anyone coming from the main door.

In the third chapter of our demo we lead the user to think that the killer was the lover of Bonmartini, but we do not say the name of the

woman. In a complete version this would be Rosina Bonetti, the maid of Bonmartini that will also be associated as the mistress. She would then testify that she had a fake identity and she was hired by "someone" to do "something". She would be quiet and not testify any longer. Given those reasons Mr. Dhdteective would ask you to continue the investigation as he does in our demo.

The last character, Pio Naldi, would participate in the final interrogation and give more hints that lead the user to choose Tullio as the main killer (He would say that he knew that something bad was about to happen and tried to avoid it).

Another thing that we would add to the final version of our Project would be a part dedicated to the press. In the complete game, a little time would pass in between investigation. During these time, the user would be provided with the various newspapers published during that time. In particular the user would be presented to the battle between Christian Newspapers and Socialists. We would in particularly focus on "Il resto del carlino" newspaper, "L'avanti" and "L'avvenire".

We have already created a demo for one of the newspapers even if it didn't appear in our prototype.

## Demo creation and Conclusion

In this section, we will briefly write about our demo development with some notions about the costs of production. We will then draw some overall conclusions about our project, reflect and predict about what will be the future of these kind of experiences.

We decided to implement our web application and to print the images into four panels. In our demo experience the user can use all the functions explained in this paper but the content of the storytelling is reduced in respect to what it would be the final product.

Me believe that in the future museums will adopt more and more tools to become interactive without losing too many concepts in the process, and that our project can become a model for escape rooms in museums because it's a very simple and scalable but can get amazing results with less effort than physically recreating a room with either real artefacts (running the risk that they get broken) or physical reconstruction of artefacts which can be very expensive compared to panels and digital reconstructions

We hope that our application, although simple, can give the users one hour of amusement and also cultural information that maintain the value of Museums.

*Tell me and I forget, teach me and I remember, involve me and I learn.*

(Benjamin Franklin).

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