



# Development of a conceptual solution for interactive packaging for olive oil

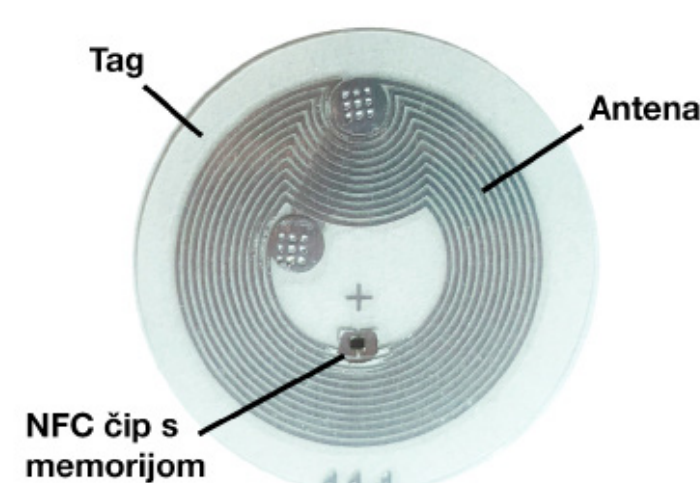
Vidulin Lina, Ivana Bolanča Mirković, Igor Majnarić, Zdenka Bolanča  
University of Zagreb Faculty of Graphic Arts, Zagreb, Croatia

## Introduction

Interactive packaging can further attract customers with product information. [4] Short-range communication (NFC) is a data exchange technology based on radio frequency identification technology. Information from NFC is transmitted to another device by electromagnetic induction, and the efficiency of connecting the device depends on the design, configuration and settings of both antennas. [9, 10] Data transmission at a distance of 2 to 5 cm ensures security against data theft. [3] Manufacturers who use NFC technology in their packaging record good reactions from customers. Some of them are Böen which cooperates with SharpEnd and Guala Closures and the cooperation of OTACA Tequila and Identiva [6], [15] The aim of the work is to design a packaging prototype for extra virgin oil according to the results of the survey so that the designed packaging would be attractive to consumers. The packaging would meet sustainable design standards with modern NFC tag technology.

## Methods

The conceptual design of the primary eco-packaging for olive oil combines the premise of sustainability and the features of smart packaging. NFC tag type 2, i.e. NTAG216 read-write model of the company NXP, was used to create the prototype of the packaging product. The NFC tag is placed on a transparent PET label (Figure 1).



**Figure 1**  
Photo of a sticker with an applied NTAG216

**Table 1.**  
Properties and characteristics of NTAG216

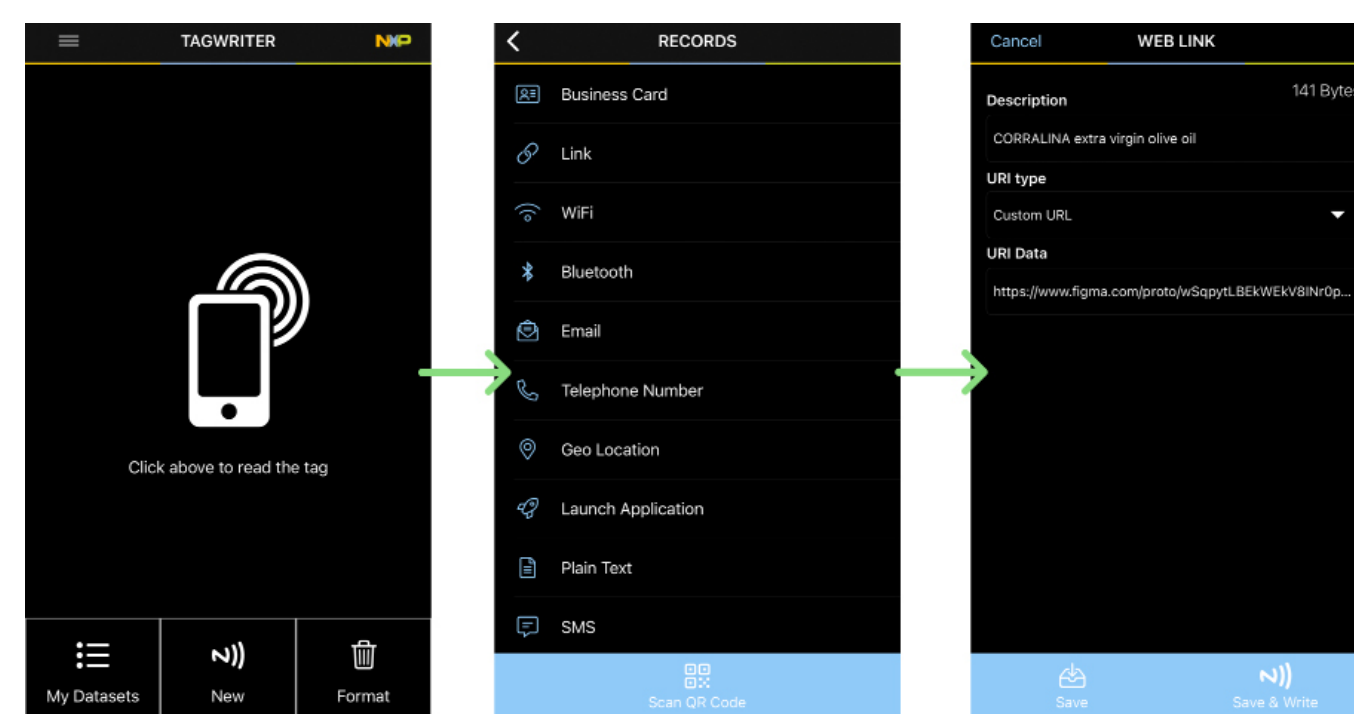
Properties	
water resistance	incompletely
transparency	completely
Technical characteristics	
diameter	25 mm
thickness	0,18 mm
frequency	13.56 MHz
data transfer speed	106 kbit/s
read/write memory capacity	888 bytes
password security	32-bit

The NFC tag is resistant to a certain amount of moisture from the surrounding atmosphere and, due to its small dimensions, is almost imperceptible to the eye (Table 1).

NFC encoding was performed using the manufacturer's official application (NXP TagWriter). The application on the menu offers various functions that can be coded on the tag. In scientific research, a web address (link) is coded into the prototype, which points to an interactive personalized product page.

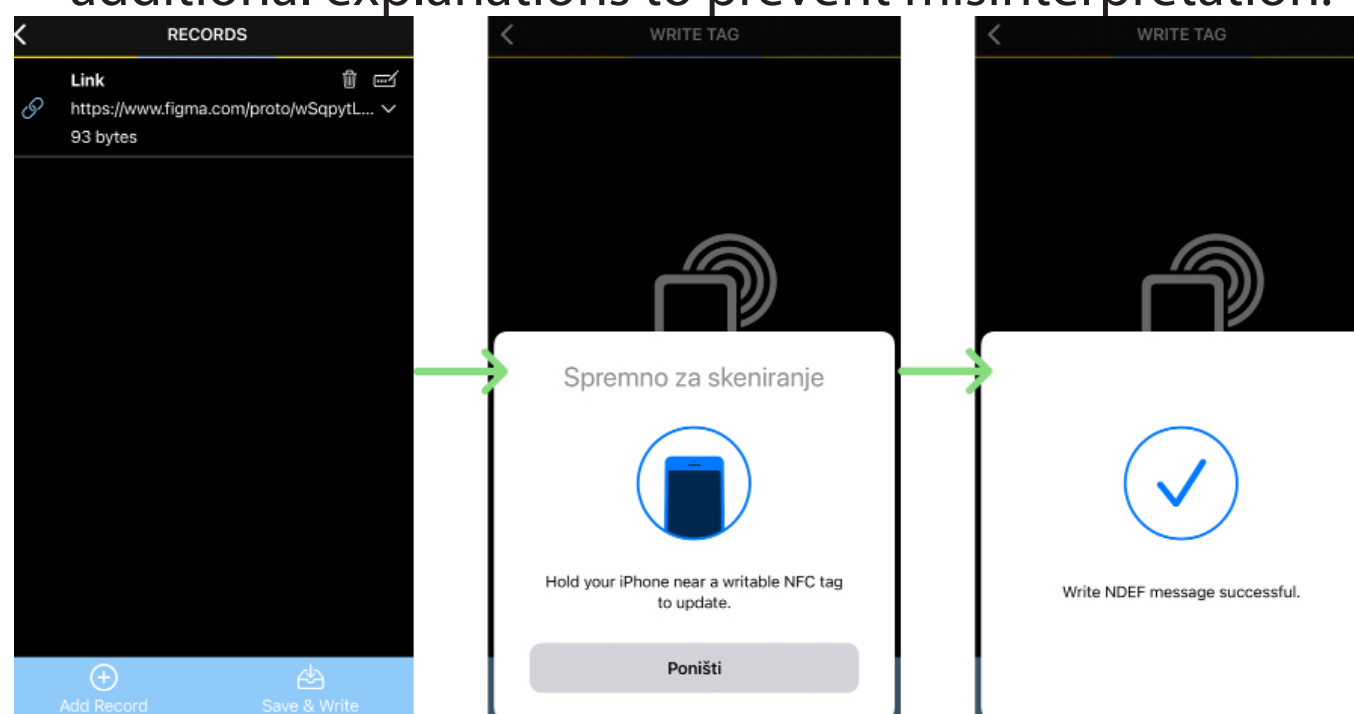
## RESULT

In order to save and transfer the desired function to the NFC tag in the NXP TagWriter application, default records are stored and printed. After opening the application on the mobile device, the NFC tag is coded (Figure 2).



**Figure 2.**  
Encoding process through the NXP TagWriter application, part I

The desired link related to olive oils, size 95 bytes, has been prepared. NFC tags can be encoded with other functions (Figure 3). Figma was used to create an application prototype (interactive web). The application contains different information that normally appears on traditionally designed packaging. In addition, it contains information about the producer, a timeline showing the maturation of the oil over a certain period, tips for storing and using extra virgin oil, and ecological labels with additional explanations to prevent misinterpretation.



**Figure 3.**  
Encoding process through the NXP TagWriter application, part II

The steps of photomontage of the initial screen of the conceptual solution of the interactive web with the associated menu are shown in Figure 4 [12]. Information is readily available to the customer and the website is easily updated.



**Figure 4.**  
The initial screen of the conceptual solution of the interactive web [17]

There is no need for printing, which contributes to saving material consumption. Inks and adhesives can contribute to poor air quality because they contain VOC compounds that contribute to L.A.-type smog. Paper production leads to air

pollution with reducing sulfur compounds, VOCs and oxidants.

The NFC mark is applied to the dark glass packaging of olive oil of 0.5 L and 0.75 L. The choice of material is related to the preservation of nutritional properties and shelf life of the product. [11] Choice ensures sustainability as glass can be recycled an infinite number of times. An alternative would be multi-layered materials that have a lower mass, but are difficult to separate or prepare for the recycling process.

An NFC tag is applied to the packaging, above which is a sticker with basic information about the product (picture 5).



**Figure 5.**  
Primary eco-packaging for extra virgin olive oil

The design of the label and the interactive web is simple in design and green in color, which suggests eco packaging and eco olive oil. The English language contributes to global frameworks. The sticker is printed using the UV printing technique, in order to reduce the impact on the environment. [11]

## Discussion/ conclusions

The prototype of the conceptual solution was presented to respondents in the age group of 25 to 35 years. Prototype testing showed full functionality of the packaging product. Respondents about the prototype point out good features such as the simplicity and speed of available information, the transparency of the content and the interestingness of the experience.

NFC tags can be combined with sensors or NFC that record temperature. The data can be integrated with real-time location reading, fingerprint reading, and facial recognition. A special contribution of the NFC tag is the development of interactive packaging adapted to people with disabilities such as the visually impaired. On the website, it is possible to display text and images in a larger font or larger dimensions, and it is also possible to program text readers. In the future, it is planned to improve the stored functions on the tag and test the durability of the prototype.

## References

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