

# Case Study of Designing Interface of the AGH Students Information Bulletin Work Support System

Natalia Nitarska, Krzysztof Kluza, Piotr Wiśniewski, Mateusz Zaremba, Antoni Ligeza  
AGH University of Science and Technology  
al. A. Mickiewicza 30, 30-059 Krakow, Poland  
E-mail: {nitarska,wpiotr,kluza,mzaremba,ligeza}@agh.edu.pl

**Abstract**—In this paper, we present a case study research on designing the system interface for handling organisational processes implemented in the editorial office of the AGH-UST Students Information Bulletin. A study of the basic formal and legal sources, such as regulations and statutes of the organisation, was also carried out for the proper identification of goals, responsibilities, and organisational structure. To deepen this knowledge, social research was carried out, which examined how the users use the current solutions and what their needs are related to the designed system. Based on the research results and the formulated conclusions, the diagrams of business processes carried out in the organisation were created. In the discovered process models, we defined reusable sub-processes using Justified Aggregation of Neighboring Activities. Finally, the information architecture of the target system solution, followed by a medium-fidelity interface were designed.

**Index Terms**—Business Process Management, BPM, BPMN, process modelling, process models, process knowledge acquisition

## I. INTRODUCTION

THE TERM “user experience” was first used in 1993 by Don Norman, who defined his role in the team and job position at Apple Computer Inc. (now Apple Inc.) as a “User Experience Architect” [1]. The company was undoubtedly the forerunner of a breakthrough in thinking about electronic tools used today by a broad and diverse audience. A milestone in thinking about the use of computers and the design of their interfaces was the introduction of the Macintosh computer in 1984 [2]. This was an all-in-one computer with a graphics interface, keyboard, and mouse. Although all of these components had been manufactured and used before, the Macintosh forever changed the perception of what a computer could be used for and who could use it. It was not the unique, exploratory technology behind its success but the well-designed user experience associated with it. The combination of a convenient, intuitive design and an understandable graphical interface meant that computers from laboratories and large companies also moved into homes and became a part of everyday life. Almost 30 years later, our knowledge of interface design has grown so much that, in engaging in this field, we are aware that, in a field so close to human beings, we must take into consideration not only design issues but also psychology, sociology, and many other fields – both technical and humanistic.

In this paper, we discuss the problem associated with the lack of a unified, transparent system for handling work

and processes based on the example of the AGH-UST Media Center at AGH University of Science and Technology in Krakow, Poland. These problems have become particularly noticeable at the time of the organisation’s transition to a remote working mode. The example used in this paper is the design of a process handling interface implemented in one of the four independent editorial boards – the AGH Students’ Information Bulletin. The history of this student magazine dates back to about 1988. Since then, the Bulletin’s editorial team has greatly expanded its scope and today, it not only publishes a periodic student magazine but also maintains a website or podcasts.

Problems in managing the editorial board, which is characterised by frequent replacement of members, became significantly apparent after the transition to a remote mode of operation. When new members are introduced to their procedures completely remotely, and it is impossible to show, add, and explain some processes in person, it is easy to see that functional solutions for coordinating work are introducing mistakes to the new users. In addition, the systems and applications that are used in the organisation not only do not fully meet the needs of its members but using them without discerning the working in the organisation in the land-based mode becomes a challenge.

The purpose of this paper is to present the process of designing a user interface for handling the work of the AGH-UST Student Information Bulletin, being able to almost replace the existing currently used toolbox (tools and platforms), both for project coordination and communication among members. Moreover, the implementation of this system could allow for significant improvement and ease of work for regular members, as well as clearly facilitate the implementation of new, constantly emerging issues organisations. The platform would also allow for more efficient documentation of the work of the editorial board.

This paper is organised as follows: Section II presents the basic principles of user interface design, including the related psychological aspects. Section III presents the motivation behind our research and the analysed problem, including interviews with the study participants. The part of our research that covers process discovery was described in Section IV. We present the final design of the user interface in Section V and finally, Section VI summarises our contribution presented in this paper and provides the overview of the future works.

## II. USER INTERFACE DESIGN

According to the book *"Human-Computer Interaction"* [3], the term *HCI* has been in common use since the early 1980s, but research in this area began early in the last century. The original focus was the study of human interaction with machine. As the state of the art and computerization advanced, the focus of the research was changed to human-computer interaction. Information technology (hidden today under the acronym *IT*) is another field that has influenced the development of *HCI*. It is for it today that consideration of *HCI* principles is crucial, as an integral part of the design process. The user (understood as both an individual and a team) interacts with the computer to achieve a specific goal.

### A. Shneiderman's Eight Golden Rules of Interface design

A precursor to viewing computer systems from the perspective of the user interface is American computer scientist Ben Shneiderman [4]. Shneiderman today is considered to be one of the third "fathers of User Experience Design". His book *"Designing the User Interface"* [5] published in 1987 was the first complete textbook on how to design user interfaces. Most importantly, the book featured the first set of universal principles for designing UI. The Eight Golden Rules of Dialog Design (*"Eight Golden Rules of Dialog Design"*) and the body of Shneiderman's work and research were also the basis for the development of the field of User Experience Design. Thus, Shneiderman's 8 Golden Principles can be cited [6], [5]:

- 1) **Strive for Consistency**. As the author points out – it is the one most often violated, but failure to follow it is also the easiest to fix and avoid. The principle refers to the need to use the same terminology when giving the same information and marking the same actions, but also to use color codes for interactive and fixed elements, the same icons, call-to-actions, or consistent sequences of actions in similar situations. As defined in the Interaction Design Foundation's article on the Golden Rules – "...the user should be able to use knowledge from one action to perform another." [6]. Situations where consistency is extremely difficult or impossible should be kept to a minimum. Adherence to this principle helps users learn to use the system more quickly and in sequence, achieve their intended goals more quickly.
- 2) **Enable Frequent Users to Use Shortcuts**. As the frequency of system use increases, the desire to reduce the amount of interaction time increases. Hidden commands, remembering once entered data, auto-complete data, and all shortcuts are appreciated by regular users. Following this principle allows users to achieve their goals faster and easier.
- 3) **Offer Informative Feedback**. The principle refers to the fact that with every user action, there should be feedback from the system, telling about the success or lack of success of the action. It is important that the information should be given in an accessible way to the user, rather than being, for example, just a message

about the error code that occurred. The information can be modest for less complex actions, such as displaying the requested information when the user clicks on an item, or more extensive for more complex operations, such as a pop-up with a message about why the action failed.

- 4) **Design Dialog to Yield Closure**. The action the user takes should have a clear beginning and end. This means that the user at each step of the process should know at which point they are. An example of a correct fulfillment of this principle would be the display of a thank you message after a purchase has been made in an online store, or the announcement that data has been successfully updated after the user has made changes to the system.
- 5) **Offer Simple Error Handling**. The system should inform the user of errors it makes, their severity, and type, but should also do so in a manner that is as benign as possible. The interface must not make the user feel guilty for making an error. A way to satisfy this principle might be to indicate specific places, such as form fields, that have been filled in incorrectly or not filled in, rather than having the system reject the entire form only after it has been filled in and submitted without indicating where the error occurred.
- 6) **Permit Easy Reversal of Actions**. The principle refers to allowing the user to reverse their own actions. In performing any action, users will make mistakes, and so the key to reducing their frustration when they make them is to ensure that at any time their mistake can be corrected. Shneiderman also emphasises that knowledge of the ease of undoing actions encourages users to explore unexplored options. Undo options should be possible after a single action as well as a sequence of them.
- 7) **Support Internal Locus of Control**. The principle encourages putting the user in the role of initiator of system actions. The user should feel that it is the user who decides how the system functions - after all, the system is a tool in the user's hand, designed to help the user achieve the desired goal. The user should have a sense of complete control over the processes occurring in the virtual space.
- 8) **Reduce Short-Term Memory Load**. The principle refers to the limited capacity of human short-term memory. To the best of today's knowledge, it can hold 7 plus or minus two items. Therefore, the interface should not require the user to remember more information at once. Additionally, the usage of the interface should be based on recognising elements more than recalling them from memory, which generates more stress for users and consumes more time.

All of the above principles provide a basis for further consideration and development of knowledge about user interface design and human-computer interaction.

### B. Ten Usability Heuristics

Another important step in the development of the field of user experience design was Jakob Nielsen's formulation of the 10 Usability Heuristics in 1994. It is a set of ten core principles of interaction design. Nielsen's heuristics are still used today and still form the basis of usable systems design. The content of the heuristics has remained unchanged to this day, but the article in which they were presented was enhanced this year with examples and explanations of the [7]. In reference to Shneiderman's golden rules presented earlier, the essential step seems to be Nielsen's addition of two rules:

- 1) **Match between system and the real world.** The principle refers to enabling users to use the knowledge acquired in the real world to function efficiently in the virtual world. We are talking both about using language familiar to the user, instead of industry jargon, and about following concepts and schemes of operation familiar from the real world. The issue of basing digital products on knowledge about the functioning of the real world was later extended by Don Norman.
- 2) **Aesthetic and minimalist design.** This principle pioneered the perception of aesthetics as an important element of an interface, affecting its perception, and, more importantly, the comfort and effectiveness of its use. Nielsen also cautions against placing redundant information in the interface that is merely decorative or noise. Any unnecessary information distracts from the vital information.

### C. Basic psychological concepts related to design

A significant influence on knowledge development in the field of user experience design was Don Norman's book *"The Design of Everyday Things"*, first published in 2002 [8]. It is from it that further concepts that are the basis of today's knowledge in this field were drawn. As Don Norman writes, *"For a product to have transparency, its designers must correctly apply five basic psychological concepts [...], namely affordances, signifiers, constraints, mappings, and feedback. Nevertheless, there is a sixth principle, perhaps the most important of all: the conceptual model of the system"* [9]. Thus, definitions of the basic concepts can be quoted after Norman:

- 1) **Affordances** – is the ability to perform a particular action that an object manifests. Whether an object manifests a given affordance is also dependent on the person who interacts with it. For an adult, a staircase manifests the affordance of ascending or descending it, and from this follows its function – to enable upward or downward movement. For a child who cannot move up or down stairs, stairs will not manifest this affordance, as so they will not serve the same function either. Affordances allow us to identify the function of objects without having to use labels or put additional information on them. The opposite concept to affordances is anti-affordance [10] – the perceived inability

to take a particular action. Importantly, objects should clearly manifest their affordances and anti-affordance so that the user can easily identify them. The problem begins when an object manifests an affordance that is not related to its actual function. This is, for example, a doorknob that manifests an affordance for pressing it, but under pressure, it does not fall at all and does not cause the door to open.

- 2) **Signifiers** – is a specification of how or where an action is performed. Markers can be placed on an object intentionally or be found on it by accident. Markers are often confused with affordances. The concepts are not the same; however, the boundary between the two has also been drawn by Norman – *"Affordances specify what actions are possible. Markers tell you where to perform them. One and the other are necessary"* [9]. Thus, we can call a marker a button in the interface of a system dedicated to cell phones. This marker uses the affordance of touching the screen, which the cell phone had much earlier than the system in it.
- 3) **Constraints** – Constraints (like the knowledge that the user has) can be divided into those that occur in the world and those that occur in the mind. Both types accompany users when using both digital and physical products, and so they should be considered during design:
  - **Boundaries in the world** are those that do not provide a physical way to perform a particular action. This is, for example, the lack of a handle or wheels on a heavy object, the lack of a handle on a door, or the lack of finger holes in a bowling ball,
  - **Boundaries in mind** are related to cultural code, among other things. These are activities that the user must have learned not to do, but the design of the product or system allows for it. It is, for example, the fact that we typically use a computer mouse using our hands, although its design does not preclude using it with our feet or other body parts.
- 4) **Mappings** – (in user experience design) is a way of mapping/showing the relationship between controls and controls. The more natural the mapping, the better the functionality. Norman also distinguished three levels of mapping:
  - **Best mapping** – controls placed on elements controlled.
  - **Second best mapping** – controls placed closest to the controlled elements.
  - **Third of the best mappings** – controls are placed in the same configuration as the controls.
- 5) **Feedback** – this issue has already been directly addressed by one of Goldman's Golden Rules, but has been significantly developed by Norman in *"Design Everyday"* [9]. Among other things, he pointed out

that the type of feedback should be appropriate to the action. Feedback that is too pushy can distract the user and introduce unnecessary chaos. Another mistake to avoid is too much feedback, which is only meant to be part of the process the user goes through, not the backbone of it. In addition to this, the time in which the feedback is given to the user is important. Even a slight delay can cause anxiety, which should be avoided.

- 6) **System conceptual model** – according to an article on mental models on the NNgroup website – “*The conceptual (mental) model of the system is everything the user believes about the system*” [11]. The definition has two important aspects:
- **The conceptual model is based on the user’s knowledge or belief, not on the actual operation and building of the system.** For best results, the conceptual model should be as close as possible to the actual operation of the product.
  - **Every user of the system has their own, different conceptual model of the system.** Consequently, the conceptual model of the designer and the user also differs significantly. The designer’s model is usually based on the greater knowledge of the product that he has. His task, however, is to create the design in such a way that the users’ conceptual models are as close as possible to the actual operation of the system.

All of the above principles and concepts have outlined the theoretical foundations of today’s approach to user experience design, inextricably linked to user interface design.

### III. MOTIVATION AND RESEARCH PROBLEM

The main goal of the undertaken activities is to create an interface for the editorial office of the AGH Student Bulletin. In order to achieve the intended purpose, it was necessary to recognise in detail the scope of the needs of the editorial office members. The purpose of the research part of this study was therefore to explore the processes occurring in the editorial office and to create models depicting the tasks and roles of all its departments and external bodies.

One of a major challenges in building complex process models is the identification of sub-processes [12]. The Bulletin is composed of three main departments: journalistic, graphic and promotion and cooperation. Most of the processes are concentrated within them. The projects carried out by the editorial office, however, link the work of all its departments and were therefore treated as sub-processes of the core workflows.

The research included: in part one, an analysis of communication channels and organisational documents provided by the editorial office, and in part two, in-depth individual interviews [13]).

A schematic of the organisational structure of the Media Center is shown in Figure 1, which distinguishes the governing bodies of the Bulletin’s editorial office and those collaborating with it in the processes carried out. The research group consisted of the Editor-in-Chief, his Deputy, and the

heads of the following departments: journalism, graphics, and promotion and cooperation.

#### A. Interview Structure

The interviews were semi-structured, with detailed questions subject to modification during the interviews. Accordingly, a preliminary scenario was created before the research began.

##### 1) General questions

- How long have you been a member of the Bulletin editorial board?
- How long have you been in your role?
- How many people does the department you manage include?
- How many of them are people who joined you in this semester?
- How many of these people have you worked with for more than a year?

##### 2) Questions about completed projects

- Which projects does your department manage?
- In which other editorial projects are you involved?

##### 3) Identification of responsibilities

- What responsibilities do department members have?
- What are the responsibilities of the person managing the department?
- With what frequency should they be performed?

##### 4) Definition of tools

- What tools (online and offline) do you use in carrying out your responsibilities?
- Can you show me these tools (via the screen share option)?

##### 5) Process discovery

- Imagine that I am a new person in your editorial office. Can you walk me, with the help of screen sharing, through the processes of performing the most important duties in your editorial office/department?

#### B. Related Works

The main topic discussed in this paper is the user interface design for a work support system. The main principles of building collaborative online applications have been widely discussed since the early 2000s [14]. However, in recent years, one can observe rapid technological developments in the area of Human-Computer Interaction [15] that let the researchers and IT architects look for new ways to improve the overall user experience. In our work, we also mention the role of social media which are increasingly more present as a collaboration tool in companies and organisations [16].

To define use cases for the discussed application, we based our research on Business Process Model and Notation (BPMN), which is a common standard for representing application flows [17]. Although there exist methods to generate

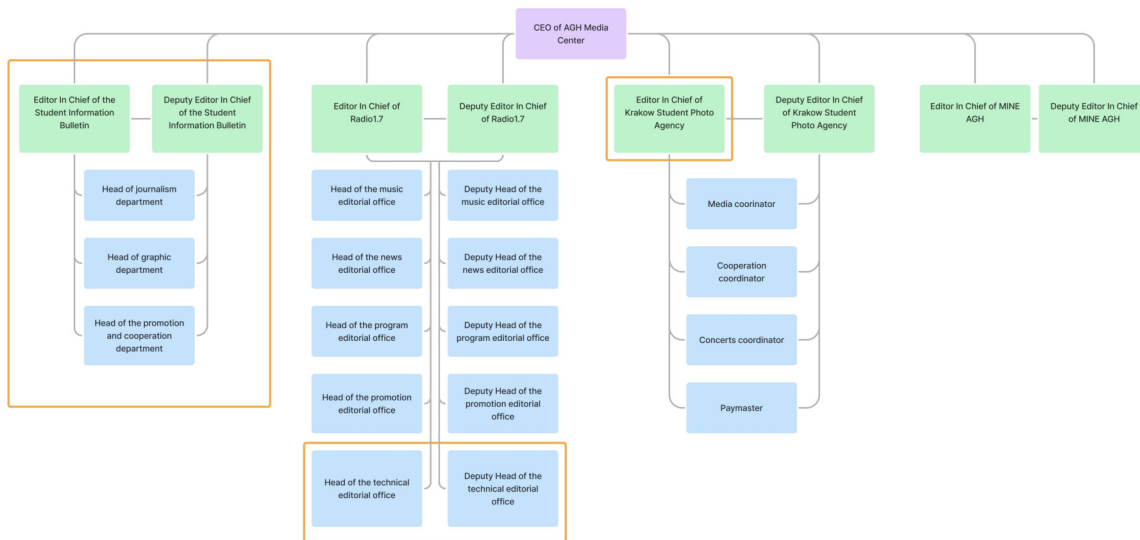


Figure 1. The organisational structure of the AGH-UST Media Center

graphical user interface prototypes based on process models [18], [19], due to large process complexity we decided to perform this action manually.

As it has already been mentioned in this section, one of the significant steps leading to an interface design is the identification and modelling of processes within the organisation. Process discovery can be done using one of the automated process mining techniques [20], one of the common approaches being identifying patterns based on log files [21]. Since the editorial board of the Students Information Bulletin does not use any integrated IT system, automated process mining has been excluded. In such a case, one of the possible approaches is the visual identification of business process elements [22]. In our case, we based our process discovery on user interviews and manual document analysis, analogically to our previous work, where business processes of a training company were identified and discussed [23].

IV. BUSINESS PROCESSES OVERVIEW

This section presents the processes performed in the editorial office, as identified through research. The processes were modelled using BPMN 2.0 notation and described.

The basic structure of the newsletter consists of three departments: journalism, graphic design, and promotion and collaboration. The entire editorial board includes more than thirty members and interns. Each of the departments is run by one managing person. The activities of the entire editorial office are supervised by the Editor-in-Chief and his Deputy.

The main result of the editorial staff’s work is the periodic publication of a magazine – a quarterly – in electronic and printed form. All departments participate in the process of creating the quarterly. The most effective form of distribution

of magazines during the pandemic has become BISdelivery – sending out magazines ordered through a form on the website throughout Poland, in cooperation with the Post Office of AGH-UST. The Bulletin’s editorial staff also maintains a website that publishes both electronic editions of the magazines and self-contained articles.

An additional project carried out by BIS, in cooperation with the editorial office of Radio1.7, is the BIScast – a podcast in which audio versions of texts published in the magazines are created.

In order to identify the processes carried out by the members of the editorial team, the platforms for their mutual communication and the work tools they use were analysed. The most important functions they play in the work of the editorial office have also been identified.

A. Communication Platforms

1) Microsoft Teams

- organising online meetings,
- publishing meeting summaries.

2) Facebook

- publishing meeting summaries.

3) Facebook Messenger

- fast communication in private chats and group conversations.

B. Working Tools

1) Facebook

- publishing marketing material.

2) Instagram

- publishing marketing material.

### 3) Google Drive

- creating work schedules,
- creating publication schedules,
- storing files with article content and graphics.

### 4) Adobe Creative Cloud

- creating graphics,
- composing the bulletin and its parts.

### 5) Canva

- creating graphics for social media.

## C. Quarterly Issue

Work on the quarterly begins with a meeting of the entire editorial team, at which the team members, first of all, agree on the theme and the leading color of the graphic design of the latest issue. At this meeting, the key deadlines for the submission of partial texts, their composition, and the deadline for the composition of the entire magazine are also established. After the meeting, all arrangements are written down in form of a post on the Microsoft Teams platform. The first modelled stage of the work is shown in Figure 2.

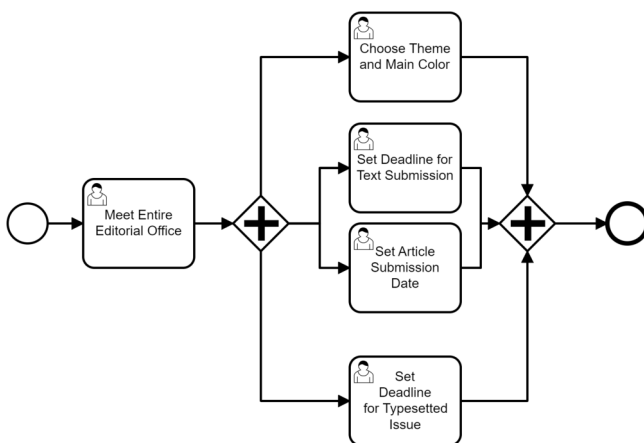


Figure 2. A BPMN model of the quarterly issue planning process

Next, the process of creating texts in the journalism section begins. The head of the department creates a table on Google Drive that will contain a list of texts for the latest issue. A meeting of the journalism department is held, where the table of topics is completed – each of the members and interns is to propose a topic for at least one article, summarize what the article is supposed to be about, specify the section to which it will be assigned, and complete their name in the "Who proposes?" column. The topics of the texts are free and they are divided into several categories. After the meeting, everyone has time to declare writing at least one of the proposed articles, and then the head of the department assigns proofreaders to specific texts.

The first step in the work of writing a text is to become familiar with its subject matter and necessary sources. Once the text is written, it should be uploaded to the appropriate folder on Google Drive. Later, one should also uncheck the

text upload in the table with texts. The corresponding record then turns red and the proofreader knows that the text is awaiting correction.

The text correction process then begins. Proofreading involves editing the document provided by the editor and giving the editor suggestions on how to avoid further errors, such as through the suggestion option in Google Documents. However, this option is imperfect in that the text creator must manually accept all corrections by the proofreader, or they will not be saved. The proofreader is also obliged to change the file name to "CORR\_IN\_title" (where IN are the first letters of the proofreader's first name and name) so that when one goes to the "Texts per page" folder, they will know for sure which texts have been corrected. After language proofreading, the proofreader should also uncheck the checkbox in the "Proofreading" column.

After defining all the activities and their sequence, the identification of sub-processes has been conducted. For this task, we used the method called Justified Aggregation of Neighboring Activities, the idea of which is based on graph models [24]. In order to declare a set of activities as a sub-process, the following conditions must be met:

- 1) Activities are connected with a sequence flow.
- 2) There is one clear starting point of the candidate sub-process.
- 3) Outside boundary activities are defined. In order to be considered an outside boundary activity, task or sub-process has to fulfill at least one of the three conditions:
  - its meaning is not related to any of the tasks already included in the candidate sub-process,
  - its responsible function (represented by annotation or a swimlane) is not present in the candidate sub-process,
  - in case of multi instance or recurring activities, its instances do not match with the other activities in the candidate sub-process

The modelled process can be found in Figure 3. One of the identified sub-processes is "Write Text". In this case, *Assign Proofreaders* has been defined as an outside boundary activity, as it is executed by another process stakeholder and is not a multi-instance activity, unlike the other tasks included in the sub-process. The second outside boundary activity is *Proofread Text*. Although it is also a multi-instance activity, its instances involve different participants than those in the case of proofreading.

When all the texts for the quarterly journal are ready, a table is created by the head of the graphics department to divide the further work. The titles and sections of the texts are copied from the table of the journalistic department. For convenience, links to specific documents from the journal section folder are also pasted. The chief then distributes the illustration and composition of the texts among the members and staff.

The issue's editorial cycle includes cover design, photo pages, and cover art for later published podcasts. The cover

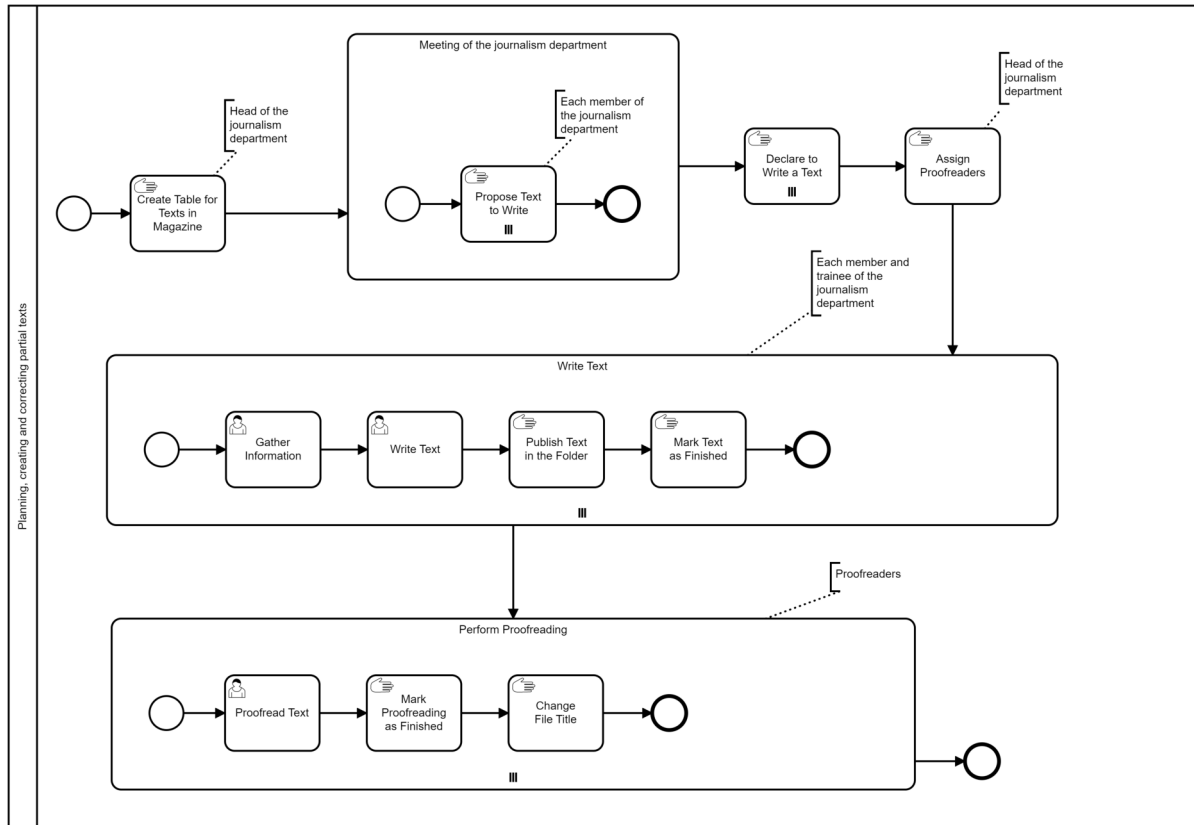


Figure 3. The process model of planning, creating and correcting partial texts

photo and photos for the photo pages are obtained by the editors from the Krakow Student Photo Agency. Usually, the photos are also placed on Disk Google.

By the previously agreed date, illustrations for the text and other materials, exported separately in Adobe Illustrator and text filed in Adobe InDesign, should appear in the Google Drive folder. No additional form of proof of submission materials is required.

The next step is the composition of the entire magazine, which the Editor-in-Chief usually does. He then processes the files obtained from all the graphic designers and creates one, preparing the magazine for printing. The modelled process can be seen in Figure 4.

When the quarterly magazine is ready for printing, the preparation of a subpage with its content on the website follows and the preparation of promotional materials begins. In order to plan the work, the promotion and collaboration department uses a spreadsheet, designed in the shape of a calendar. The calendar schedules posts for the following weeks. Often, however, the information in the spreadsheet is inaccurate or selective. First, the type of material to be published regarding the text is determined - a photo or a graphic. This is followed by scheduling the publication of material for specific days and assigning people to perform specific tasks. Materials for posts are prepared in Canva, where

the promotion department works as a team. This means that members can share projects with each other, create templates or use a common content planner. There, posts are created in their entirety because the service also gives the ability to add images and descriptions to specific posts. The final step in the development of the quarterly journal is its distribution. The first form of distribution was direct delivery of printed copies to university departments, student house receptions, and dining facilities. Currently, the distribution consists mainly in sending the magazines (in cooperation with the AGH-UST Post Office) throughout Poland. Orders are collected using a form on the internet website.

*D. Website*

Only those in charge have the ability to edit the editorial page. Three times a week (on Monday, Wednesday, and Friday), new articles are posted on the website and - once every three months - a subpage with the new quarterly issue.

Each member and intern of the journalism department is required to write at least two articles for the website per month. Once a month, during a meeting, everyone completes their proposed topics in the appropriate table on Google Drive. Afterwards, the editors have time to commit to writing an article (either their own or someone else's). Then the head of the department establishes the schedule for the publication of the texts on the site, and according to this criterion, determines

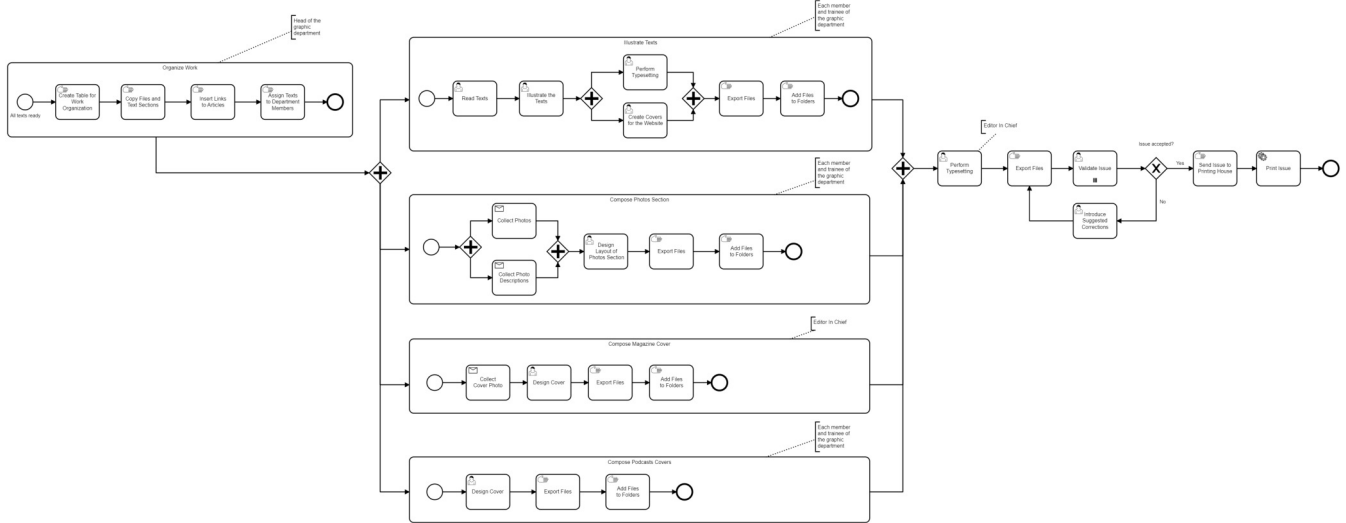


Figure 4. The process of planning, illustrating, and composing the issue and its parts

when the text should appear on the shared drive, and who is responsible for its correction and publication.

Proofreading is a very important part of the process, without which the text cannot be published on the site. Language proofreading is done by three designated individuals in the department. When scheduling articles for publication, they are also assigned to do proofreading of specific articles.

The article-writing process then begins, which is always preceded by gathering information on the topic. After submitting an article to the disk (as in the table on texts for the quarterly journal), editors check the checkbox located to the left of the record with their text. The record then turns blue and the person assigned to language proofreading knows that the text is awaiting correction. After the linguistic correction, the proofreader should also uncheck the checkbox in the "Correction" column so that the person publishing the article knows that it is ready for publication (after which they should also check the appropriate checkbox indicating that the text has been published).

It turns out that a characteristic system error is that editors often forget to check boxes after the task is done, making the system ineffective because it does not provide reliable information. Therefore, all information must be independently verified, both before proofreading texts and publishing them. The modelled process can be seen in Figure 5.

The graphics department is not involved in the creation of posts for the website; once published, the link to the text is usually shared on Facebook and in Instagrams stories, which are handled by members and interns of the promotions and collaboration department. The posts usually appear on the same days as the texts, namely on Mondays, Wednesdays, and Fridays. The head of the promotion department distributes the posts to the editors on a regular basis, usually by sending them a private message on Facebook with a request to publish on a given day.

The promotions department uses mostly the same spreadsheet to organise their work as they do to create the promotion strategy for the quarterly magazine. The spreadsheet, however, shows only perfunctory information regarding what type of material is published on what day. It lacks information about who is responsible for publishing what materials and when. The table is also not updated on an ongoing basis, so many materials in it are not there and are published spontaneously.

## V. DESIGN OF THE SYSTEM INTERFACE

After creating the information architecture diagrams of the panels of each role, their mock-ups and prototype of the system with a medium level of detail were created. This chapter presents a schematic design of the screens that are key to carrying out the processes performed in the editorial office and departments. The layout of each page, the placement of action buttons, labels, and other elements are shown. The prototype was made in grayscale with color coding in places where the type of color indicates the status of the action.

### A. Main Page and Task List

Figure 6 shows the screen that is visible after logging in to the panel for users with the role, "Journalism Department". At the very top of the side navigation bar, located on the left side of the screen, are the user's information - first name, last name, department (this information is completed by the administrator when creating a new account), and profile picture (which can be added and changed by the user by clicking on their avatar).

### B. Quarterly Issue

Once the theme and color of the quarterly layout have been completed by the administrator, the screen shown in Figure 7 appears in the panel of the journalism department, under the tab, "Quarterly".



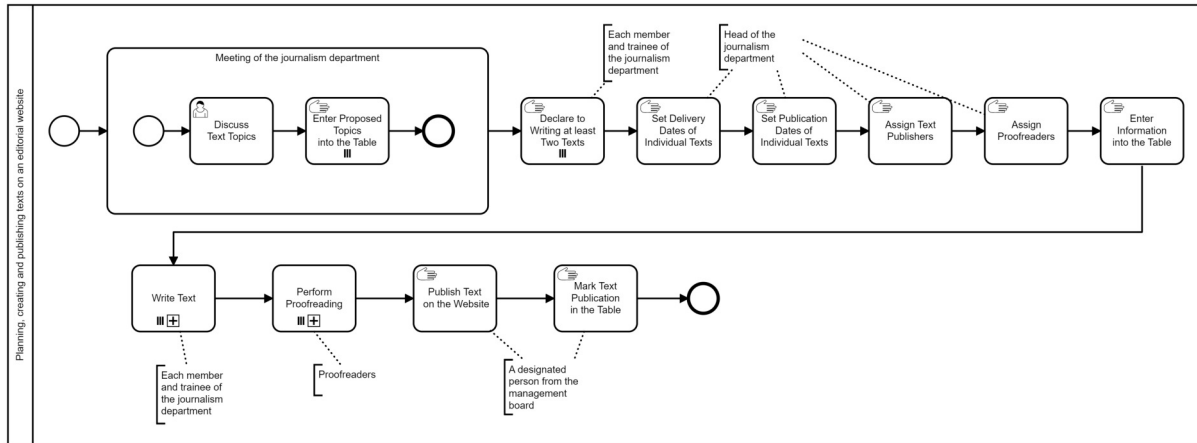


Figure 5. The process model of planning, creating and publishing texts on an editorial website

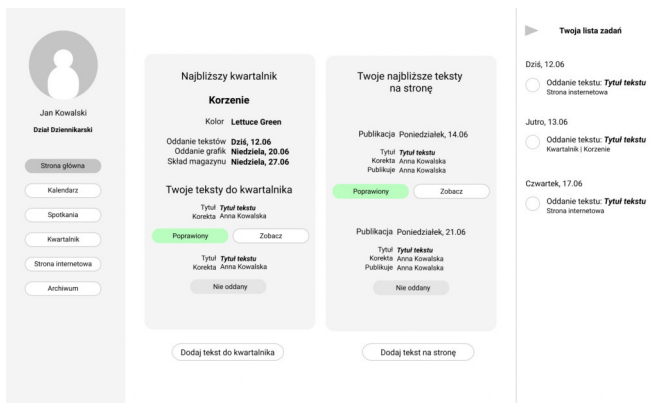


Figure 6. The view of the „Strona główna” (“Home”) tab in the user panel with the role „Dział Dziennikarski” (“Journalism Department”)

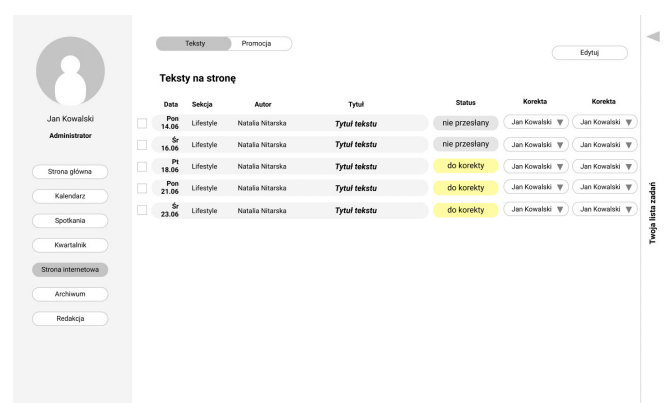


Figure 8. The view of the „Teksty” (“Texts”) subpage in the „Strona internetowa” (“Website”) tab in the user panel of the role „Administrator”)

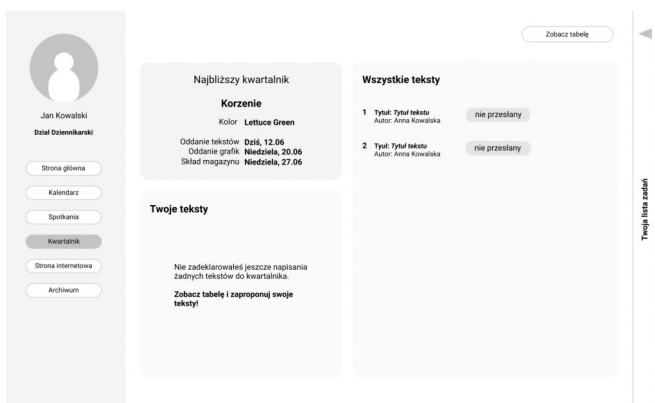


Figure 7. The view of the „Kwartalnik” (“Quarterly”) tab in the user panel of the „Dział Dziennikarski” (“Journalism Department”) role after adding a new quarterly

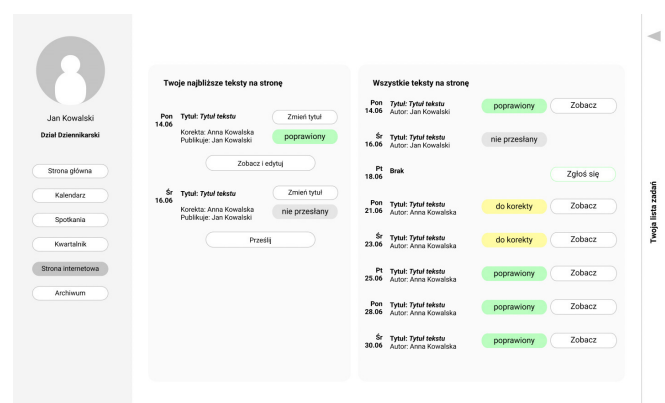


Figure 9. The view of the „Strona internetowa” (“Website”) tab in the user panel of a role „Dział Dziennikarski” (“Journalism Department”)

In the upper left corner of the main part of the screen is a banner with basic information about the upcoming quarterly. Underneath it is a section that displays the texts to which the

user has assigned himself as author. On the right side of the screen there is a section called "All texts", in which all texts for the upcoming quarterly to which an author has contributed are displayed.

### C. Website

Figure 8 shows the „Website” tab of the admin panel.

The administrator, using the "Edit" button in the upper right corner of the screen can not only edit record data, but also add new ones according to the website's text publication schedule. By default, a new record will appear for every Monday, Wednesday or Friday, but this can be freely modified by the administrator.

Figure 9 shows the "Website" tab in the panel of the journalism department. The tab is divided into two parts.

On the left side of the screen, there is information about the nearest texts for the website to which the user is assigned – planned publication date, title, who is publishing, and status. Depending on the status of the assignment, there are also buttons for , "Submit" or "View and edit".

On the right side of the screen, information about all planned texts for the website is available, sorted by publication date (from nearest to farthest).

If there are no editors assigned to a particular date, there is a button next to it called "Submit", which the user can use to declare writing a text for a particular date.

## VI. CONCLUSIONS

The purpose of this paper was to present step by step our case study of designing a system user interface that greatly enhances and organises the flow of information among members and collaborators of the editorial board of the AGH Student News Bulletin. With the use of various research methods such as observation, social research, and process exploration methods, we analysed the activities executed by the editorial board, communication platforms, and members' working tools. Using knowledge of user interface design, we designed a system interface that effectively reduces the need to use many of these tools and provides a platform through which most of the information needed by the editorial board can be collected and transmitted.

In order to effectively accomplish the stated goal and properly design the system interface, we focused on one of the four editorial offices. This enabled accurate data analysis and the elimination of errors. Using the lessons learned during the research phase, it was possible to design an interface to support the work of the entire organisation.

Further possible activities in the development of the project might be focused on conducting usability tests of the prototype with members of the Bulletin editorial staff. After testing the designed solutions and making necessary corrections, it would be necessary to develop the graphic layer of the project and develop both the front-end (based on the designed user interface) and the back-end for the presented system.

## REFERENCES

- [1] D. Knemeyer and E. Svoboda, "User Experience-UX in The Glossary of Human Computer Interaction," *The Interaction Design Foundation*, 2015.
- [2] S. R. Stein, "The "1984" macintosh ad: Cinematic icons and constitutive rhetoric in the launch of a new machine," *Quarterly Journal of Speech*, vol. 88, no. 2, pp. 169–192, 2002.
- [3] A. Dix, A. Dix, J. Finlay, G. Abowd, and R. Beale, *Human-computer Interaction*. Pearson/Prentice-Hall, 2003.
- [4] B. Shneiderman, "Designing for fun: how can we design user interfaces to be more fun?" *interactions*, vol. 11, no. 5, pp. 48–50, 2004.
- [5] —, *Designing The User Interface: Strategies for Effective Human-Computer Interaction, 4/e (New Edition)*. Pearson Education, 1987.
- [6] E. Wong, "Shneiderman's eight golden rules will help you design better interfaces," <https://www.interaction-design.org/literature/article/shneiderman-eight-golden-rules-will-help-you-design-better-interfaces>, dostę: 2021-04-21.
- [7] J. Nielsen, "Ten usability heuristics," <https://www.nngroup.com/articles/ten-usability-heuristics/>, dostę: 2021-04-21.
- [8] N. N. Group, "Nn/g history," <https://www.nngroup.com/about/history/>, dostę: 2021-07-03.
- [9] D. A. Norman, *The Design of Everyday Things*. Currency Doubleday, New York, 2013.
- [10] S. Harwood and N. Hafezieh, "'affordance'-what does this mean?" in *22nd UK Academy for Information Systems International Conference: Ubiquitous Information Systems: Surviving & Thriving in a Connected Society Oxford*. St. Catherine's College Oxford, UK, 2017.
- [11] J. Nielsen, "Mental models," <https://www.nngroup.com/articles/mental-models/>, dostę: 2021-04-21.
- [12] J.-R. Rehse and P. Fettke, "Clustering business process activities for identifying reference model components," in *International Conference on Business Process Management*. Springer, 2018, pp. 5–17.
- [13] I. Mościchowska and B. Rogoś-Turek, *Badania jako podstawa projektowania User Experience*. Wydawnictwo Naukowe PWN SA, 2015.
- [14] A. Moghaddam and G. Gadanidis, "Designing an online collaboration system," in *EdMedia+ Innovate Learning*. Association for the Advancement of Computing in Education (AACE), 2005, pp. 548–553.
- [15] K. Marasek, A. Romanowski, and M. Sikorski, "Emerging trends and novel approaches in interaction design," in *2017 Federated Conference on Computer Science and Information Systems (FedCSIS)*. IEEE, 2017, pp. 1231–1234.
- [16] E. Franchi, A. Poggi, and M. Tomaiuolo, "Social media for online collaboration in firms and organizations," in *Information Diffusion Management and Knowledge Sharing: Breakthroughs in Research and Practice*. IGI Global, 2020, pp. 473–489.
- [17] J. Widén and M. Johansson, "BPMN flows as variation points for end user development: from a ux perspective," 2016.
- [18] E. Diaz, J. I. Panach, S. Rueda, and O. Pastor, "Towards a method to generate GUI prototypes from BPMN," in *2018 12th International Conference on Research Challenges in Information Science (RCIS)*. IEEE, 2018, pp. 1–12.
- [19] E. Diaz and S. Rueda, "Generation of user interfaces from business process model notation (BPMN)," in *Proceedings of the ACM SIGCHI Symposium on Engineering Interactive Computing Systems*, 2019, pp. 1–5.
- [20] C. dos Santos Garcia, A. Meinheim, E. R. F. Junior, M. R. Dallagassa, D. M. V. Sato, D. R. Carvalho, E. A. P. Santos, and E. E. Scalabrin, "Process mining techniques and applications—a systematic mapping study," *Expert Systems with Applications*, vol. 133, pp. 260–295, 2019.
- [21] P. Weichbroth, M. Owoc, and M. Pleszkun, "Web user navigation patterns discovery from www server log files," in *2012 Federated Conference on Computer Science and Information Systems (FedCSIS)*. IEEE, 2012, pp. 1171–1176.
- [22] L. S. Rosa, T. S. Silva, M. Fantinato, and L. H. Thom, "A visual approach for identification and annotation of business process elements in process descriptions," *Computer Standards & Interfaces*, vol. 81, p. 103601, 2022.
- [23] M. Nizioł, P. Wisniewski, K. Kluza, and A. Ligeza, "Characteristic and comparison of UML, BPMN and EPC based on process models of a training company," *Annals of Computer Science and Information Systems*, vol. 26, pp. 193–200, 2021.
- [24] D. Zhang, L. Liu, Q. Wei, Y. Yang, P. Yang, and Q. Liu, "Neighborhood aggregation collaborative filtering based on knowledge graph," *Applied Sciences*, vol. 10, no. 11, p. 3818, 2020.