

Thunderbird Add-On “SmartMail” for More Convenient E-Mail Writing

Eicke Godehardt
godehardt@fb2.fra-uas.de

Hendrik Pfaff
hendrik.pfaff@stud.fra-uas.de

Victoria Chaikovska
chaikovs@stud.fra-uas.de

Thomas Gabel
tgabel@fb2.fra-uas.de

Yasemin Er
yasemin-@stud.fra-uas.de

Faculty of Computer Science and Engineering
Frankfurt University of Applied Sciences
Nibelungenplatz 1, 60318 Frankfurt am Main, Germany

Abstract—In this paper we introduce “SmartMail”, an add-on for Mozilla’s e-mail client Thunderbird. It helps to increase productivity of users, especially the ones with international and multi-lingual e-mail recipients. We conducted a usability study which shows a significant acceleration of time spent writing e-mails as well as a reduced error rate for the chosen language and gender. After filling a questionnaire based on the System Usability Scale, the majority of test users rate the user experience satisfactory. Half of them even prefer using Thunderbird with this add-on over their own e-mail client.

Keywords—E-Mail, Thunderbird, Add-on, Usability Study

I. INTRODUCTION

Information overload is what most people face in today’s business communication [1]. At the workplace e-mail is used in many cases. And the amount of received e-mails is increasing ever since [2]—even when excluding spam. This statement is also supported by newer studies, e.g., from web.de and gmx, two big German e-mail providers [3].

Started as a bachelor thesis and multiple following student projects, an add-on for Mozilla’s e-mail client Thunderbird was developed at Frankfurt University of Applied Sciences (Frankfurt UAS). The idea was just to get rid the most annoying and tedious activities. For example, as long as you write to the same addressee, one usually uses pretty much the same salutation. Repeat typing this salutation over and over again is boring and error prone. On the other hand, netiquette suggests to keep up good writing style and therefor use a proper salutation esp. in business communication.

Another aspect of this add-on is helpful in writing e-mails in an international setting using different languages and unfamiliar (first) names. The need for support for different languages mainly lies in the lack of Thunderbird’s abilities. Although one can install multiple dictionaries for inline spell checking, the e-mail author needs to select the appropriate language for each and every new e-mail. So, our add-on will track language settings per e-mail address, remember and re-configure the correct language based on the recipient. To formulate good salutations the user has to know the gender of the addressee. Our add-on guesses the correct gender based on first name or previous user settings. This again is most helpful and needed in an international setting.

The extension adds new functionality, like the suggestion of gender and language of the recipients, in an unobtrusive way. Figure 1 shows some of the added user interface (UI) elements for indicating the gender in the address bar. These elements help the user choosing the correct salutation.

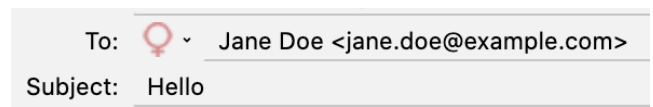


Figure 1 Screenshot of the added gender indicator of the add-on. This feature helps manually choosing the correct salutation.

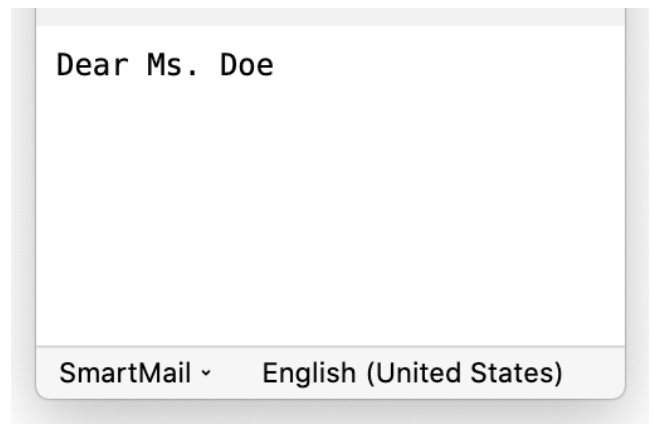


Figure 2 Screenshot of the automatically generated salutation and recognized language spellchecker.

Furthermore “SmartMail” generates a salutation based on previous conversations and switches spellchecker setting for the language of the recipient. This functionality can be seen in figure 2, which shows the autogenerated message body.

To test how the add-on is adopted by users and to improve further development, we conducted a usability study based on the System Usability Scale (SUS) and the Technology Acceptance Model (TAM). SUS is a commonly used questionnaire to measure effectiveness, efficiency and satisfaction of a user [4]. TAM is used to model acceptance of software by users [5]. The users get to compare their daily used e-mail client to Thunderbird enhanced by “SmartMail” and fill out a questionnaire about usability, productivity and acceptance. 14 randomly selected test users participated in this study. Each one writes e-mails to international recipients on a regular basis.

The rest of the paper is structured as follows. First related work is presented. Thereafter the used technology and internal design of the add-on itself is described together with all the features. Then the usability study is discussed in section V before presenting the results in section VI and discussing appropriate conclusions in section VII.

II. RELATED WORK

Many add-ons do exist for Thunderbird, as of July 2020 more than 1 400, but none offers similar functionality [6]. There is one add-on though which offers part of the here described functionality: Automatic Dictionary [7]. It saves and restores language settings based on the recipient.

III. TECHNOLOGY

JavaScript is used to develop add-ons for Thunderbird. Thunderbird as it's more successful and known sibling Firefox uses web techniques to build these extensions. Actually, Thunderbird builds on whatever is provided by Firefox. Although the development slowed down quite a bit over the last years, it gained new speed recently. That said, technology for Thunderbird is changing rapidly lately towards web-extensions, the common technology for add-on across different browsers, at least Google Chrome and Mozilla Firefox.

Based on the offered API (application programming interface) it is possible to enhance functionality and the UI (user interface). An example for the former is to attach additional functionality on the event when the e-mail is actually sent or whenever a (specific) window appears or is fully loaded. UI changing examples are either showing more information somewhere in the existing or even new windows or offering additional interactive elements, like buttons etc.

IV. DESIGN

To store all necessary information two database tables were defined. The central table contains all conversation related information and is shown in figure 3. As e-mail addresses are unique, this is chosen as the primary key for this table. Whenever an e-mail to a specific recipient is composed, the add-on tries to look up this e-mail address in the conversation table to see whether there is historic information regarding gender and salutation, and applies that very information if possible. If the guessed gender is wrong, the user can override this information, which leads to a change in the appropriate column. The user interface reflects this overwriting by showing the gender information in a more confident color, than before.

The language information is used in a more sophisticated way. First of all, this field does not contain just the last used language, but rather counters for every used language. For example, this field might contain the following:

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{“en”: 42, “de”: 13}
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That means 42 e-mails were composed using English as preferred language while 13 have been written in German. Furthermore, if no information is found for a given address (like “jane.doe@example.com”) the add-on tries to look up more generic information (in this case “example.com” or as the final fallback just “com”). Things get even more complicated when multiple recipient get involved. Then a common ground needs to be figured out between all of them.

The other, more static, table contains information about first names and corresponding gender and country information (see figure 4). This is pre-filled with free and open information from various sources. Of course, not every name in the whole world can be deployed this way. So, whenever this information is missing for a specific name, the add-on calls a REST-service to get gender information and updates this table.

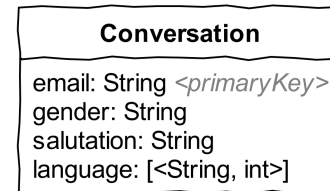


Figure 3 Data representation of conversation elements

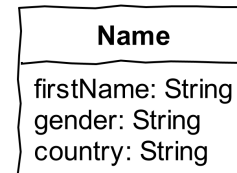


Figure 4 Data representation of name-gender-mapping

At the end—when the e-mail is actually sent—the add-on updates language and salutation information accordingly.

V. EVALUATION

After introducing the “SmartMail” add-on, we now describe the step-by-step process and methods used in the performed usability study.

The process for each of our test users starts with the first part of our two-part questionnaire, which is all about general information, e.g., age, gender, average number of e-mails a day, used e-mail client etc. This is followed by sending three e-mails with and three e-mails without using the “SmartMail” add-on, while being constantly monitored. After accomplishing the e-mail tasks, the final part of the questionnaire gets answered. It takes about 7 minutes to answer the questionnaire and about additional 5 minutes to complete the e-mail writing tasks. Due to both, the qualitative measuring via the questionnaire and the quantitative measuring of the needed time, respectively error rates, we get an overview of the performance of the add-on.

The first page of the questionnaire gets to be filled out before any e-mail is actually sent. Thereby the testers are asked to provide general information about themselves and their regular usage of e-mail. This gives us a better understanding of our potential users. The collected data is used for the scientific evaluation of the project and is treated in accordance with data protection laws and general privacy.

In the next step the tester sends three e-mails each via Thunderbird with and without the add-on to pre-defined test recipients. This test step shows the difference between Thunderbird with and without our add-on, and thus the direct impact of our add-on. The recipient for each e-mail is a randomly drawn contact from the address book of Thunderbird, prefilled beforehand. The first names for these dummy contacts are specifically chosen to be common names for females and males as well, while the surnames are chosen from common international last names. This way, it is not immediately clear for the test user which way to write the e-mail, as it's often the case with international e-mail contacts. For the salutation in the beginning of the e-mail, the test user needs to decide both, the

gender and the language. The choice is between the two common salutations like Dear Mr. / Dear Ms. in English.

The content of the e-mails are small texts provided in German and English form. After determining the language of the recipient, the test user chooses one of the texts and copies it as the e-mail content. The total time writing each e-mail is measured in seconds as well as if the participant chooses the right language and gender for the salutation for the recipient. Of course it is clear, that the longer the actual content gets in real life, the less important the time saving for typing the salutation will be.

When writing e-mails while using the “SmartMail” add-on, the user profits from the built-in functions to determine the correct language and gender, resp.

After completing the e-mail tasks, the tester evaluates and reviews his experience with the add-on on the second part of the questionnaire. In this part, the add-on is evaluated with different statements on a Likert scale from 1 – total disagreement to 5 – full agreement. The tester could also mention the missing functions and suggestions for improvement. The following important points were asked in the survey:

- How likely the system might be used regularly?
- Is the system easy to work with?
- Is there a need for technical support?
- Are various functions of the system well integrated?
- Are there any inconsistencies within the system?
- Is the tool easy to master?
- How confident is the tester in using the system?
- Is the operation of the program very cumbersome?
- Will the system make the user’s work easier?
- Is it necessary to learn a new functionality before working with the system?
- Which features are you missing from the add-on? / What could be improved?

At the end of the questionnaire the important question is asked, whether Thunderbird with the “SmartMail” add-on is preferable to their own e-mail program.

These questions are all inspired by proven survey questions from System Usability Scale and Technology Acceptance Model to get reliable feedback [4], [5].

The gathered data from the questionnaire is visualized into diagrams by Google Forms, while the quantitative measurements are statistically processed in the R programming language [8].

VI. RESULTS

With the methodology explained above the following results are gained. This section explains the qualitative results of both parts of the questionnaire and the quantitative measurements taken from the gathered data. The focus in this section is on the most meaningful results of this study.

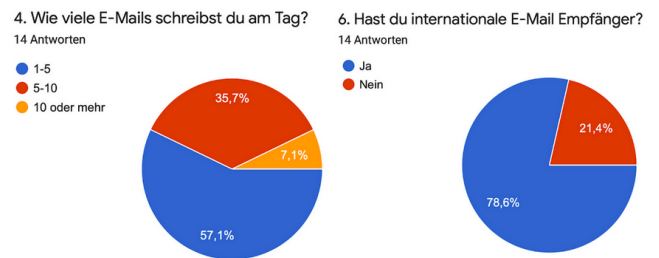


Figure 1 Gathered Information about our test users. Q4: “How many e-mails are you writing a day?”. Q6: “Do you have international e-mail recipients?”

The results of the first part of the questionnaire gives insight of potential users of the add-on and their usual habits working with e-mail. All 14 study participants have a university background whether as a student, employee or professor. Nine of the participants are male (85.7%) while three of them are female (14.3%). Their age ranges from 20 up to 61 years, with a median age of 29 years (mean of 35.2 years).

The most commonly used e-mail programs of our testers are Mozilla Thunderbird (28.6%), Apple Mail (21.4%), Microsoft Outlook (21.4%), Microsoft Mail (14.3%) and others (14.3%). “Other” e-mail clients include web-based mail programs like yahoo.com or protonmail.com. This statistic shows a fast and diverse distribution of clients, which is relevant in case the “SmartMail” add-on should ever support other software than Thunderbird.

The time the participants spent on e-mails on a daily basis ranges from 10 minutes up to 6 hours with a median of 60 minutes (mean of 90.8 min). The number of e-mails sent in this time, by the participants, is shown in figure 5. It ranges from 1–5 e-mails a day by 57.1% of our testers, over 5–10 e-mails written by 35.7% of testers up to more than 10 e-mails a day, 7.1% of testers. In figure 5 we also see, that the majority of participants (76.6%) has international e-mail recipients on a regular basis, which is not uncommon for users working or studying at university or bigger companies, which are often international focused as well.

The measured data from the six e-mails sent by the participants gives a good quantitative comparison of using Thunderbird with the “SmartMail” add-on in comparison to vanilla Thunderbird. To highlight the difference in the data, we also conduct a two-sided Student’s t-test on the mean of the data sets.

Figure 6 shows the differences in time when using the “SmartMail” add-on vs. not using it. Without the add-on, the time needed for the correct assignment of language and gender needs on median 28.5 seconds (mean 32.26 seconds). With the use of the add-on, the time needed is reduced to a median of 12.54 seconds (mean of 12.0 seconds). The difference of 15.96 seconds (mean 20.26 seconds) indicates a significant ($p = 3.455 \cdot 10^{-8}$) decrease of time spent on this decision.

As it can be seen in figure 7, the number of falsely assigned genders for the salutation decreases from 22 (52.4%) to 0 when using the add-on. This significant improvement ($p = 4.16 \cdot 10^{-8}$) is most likely due to the additional UI elements for gender indication and the pre-filling salutation function of the add-on.

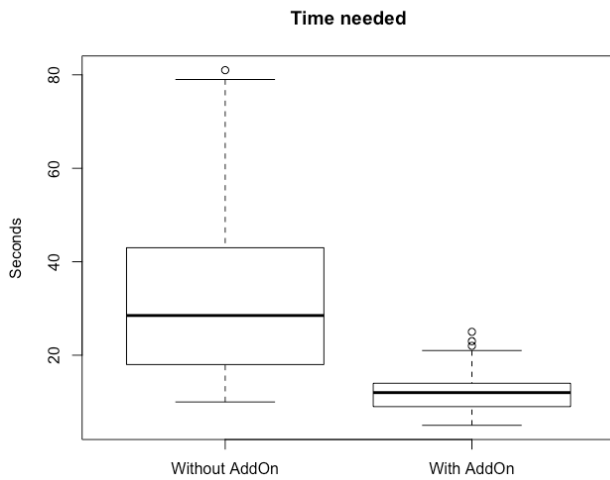


Figure 6 Time needed for sending an e-mail is significantly less when using the add-on compared to not using it.

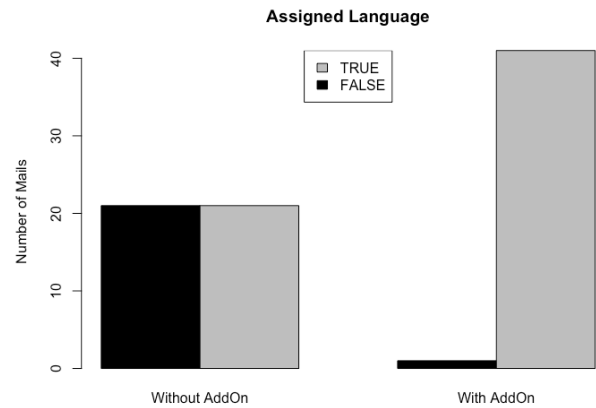


Figure 8 The language of the recipient is more often correctly assigned with the add-on.

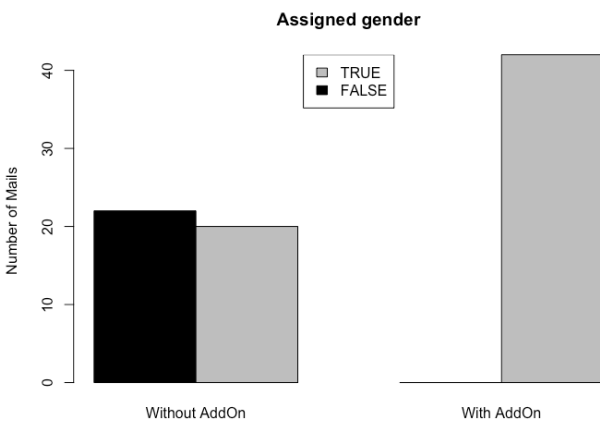


Figure 7 The gender of the recipient is correctly assigned with the add-on every time.

Also decreasing is the number of incorrectly chosen languages by the participants. Figure 8 shows a significant drop ($p = 4.347 \cdot 10^{-7}$) from 21 (50.0%) to 1 (2.4%). This difference can also be attributed to the filling in of the salutation and automatic change of spellchecker by the add-on.

Finally, the analysis of the last part of the questionnaire, shows how the test users score the add-on on several arguments between 1 and 5.

The majority of the participants (85.7%) agree, that the “SmartMail” add-on eases their work, as they rate this statement with 4 or 5 points. Furthermore, 71.4% of them could imagine using the add-on on regular basis (see figure 9) as everyone perceives the add-on as easy to use.

In the end, half of the participants prefer using Thunderbird with the “SmartMail” add-on over their own usually used e-mail client, which can be seen in figure 10.

VII. CONCLUSION

After explaining the methods, examine the usability study in section V and viewing the results received from it in section VI, a conclusion is drawn. Now the given answers from the questionnaire, the measured quantitative data collected and improvements suggested by the study participants are

interpreted. The insights gained from this usability study help improve further development of the add-on.

The measured results were gathered to provide a reproducible and quantifiable metric of the add-on’s performance. They show, that “SmartMail”, compared to Thunderbird without the add-on, really does significantly reduce the time needed for pondering over correct salutations and languages, as well as decreasing the number of falsely assigned genders and languages when writing e-mails to unknown but also re-occurring recipients.

The questionnaire of the usability study further strengthens this point, as it shows, that user experience proves satisfactory and gets accepted by every test user. The participants did not find any difficulties in completing the tasks and overall rate the add-on as easy to use and fast to learn. The survey presents clear ideas about usability. The positive user experience is nowadays a prerequisite for the successful distribution of the program. As can be established, the evaluations of the study identified valuable user interests and thus benefits the further development of the add-on.

The study shows that the main needs of the users, to work efficiently with the add-on, have been fulfilled. Yet, four recommendations for improvement of the program were expressed by the test participants in the questionnaire. These tips are very helpful for the project, from which the future tasks for further development can arise.

While conducting the study, a bug occurred that needs to be fixed in further development as well. Under certain circumstances after entering an e-mail recipient in the address bar, the cursor in the text field is placed before the salutation and cannot be moved. This error requires to close and reopen the e-mail window. As the add-on is still under development, appearing bugs are issued and handled by the developers.

One feature requested by multiple participants, is the display of confidence values to what percentage the “SmartMail” add-on is sure of the recipient gender and language. A shown probability of the assignment processes, could increase the trust of users in the add-on even more and enhances the usability.

Another recommended feature was the option to save different templates for replying to e-mails before entering the

7. Ich kann mir sehr gut vorstellen, das System regelmäßig zu nutzen.
14 Antworten

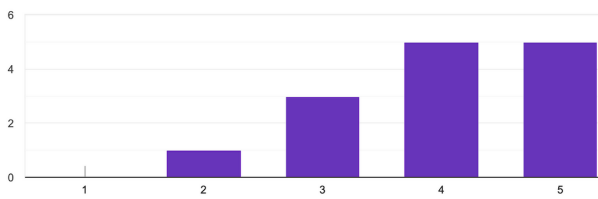


Figure 9 Final Survey questions for indicating whether the test user might use the “SmartMail” add-on regularly. Q7: “I can think of using the system regularly”

19. Ich finde mein eigentliches Mail-Programm besser.
14 Antworten

● Ja
● Nein

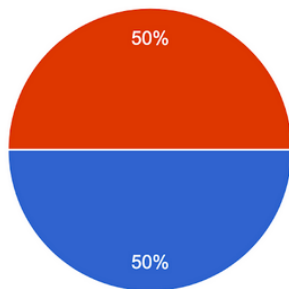


Figure 10 Final Survey questions for indicating whether the test user would stay with his/her own e-mail client. Q19: “I like my usual e-mail program more”

contact. This could help when multiple recipients or recipients from different social circles are addressed frequently.

Additional support for other e-mail clients, was the most common expressed request. As we already saw in the results, there is a vast and diverse landscape of e-mail clients in use, which could potentially be improved by the features “Smart-Mail” has to offer. Yet, considering the complexity and needed effort of porting the add-on to other platforms, this request is hard to tackle.

In conclusion we can say, that the “SmartMail” add-on is already a proven and very well perceived productivity tool, which could be even further improved by some additional

features and release to more clients. Further research opportunities can be seen in the usability testing of new features or how the add-on is accepted by its users in the long run and every-day setting.

VIII. FUTURE WORK

Even though the currently offered functionality is already helpful a couple things are planned to be worked on beside keeping the add-on up-to-date with the Thunderbird development.

One thing already in the pipeline is an improved support for newsletter unsubscribe. Usually mailing lists offer one of two ways to do that—either by a hidden e-mail header setting containing the unsubscribe information or textual links inside the e-mail body. There seems no up-to-date add-on as of now offering this support.

As mentioned above it is time to spread the add-on and gather more day-to-day user data.

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