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2022

BYLINE

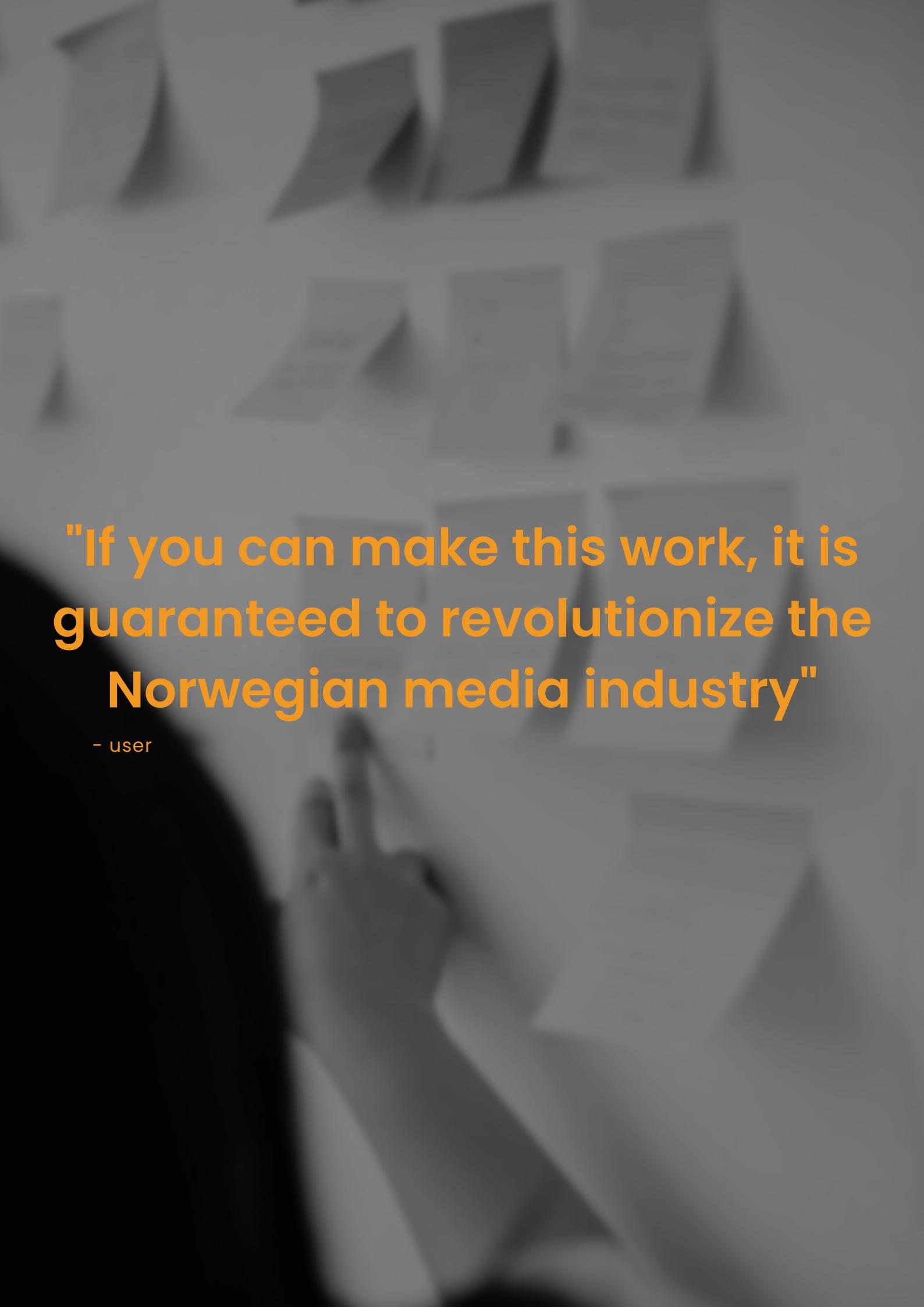
Candidates

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**"If you can make this work, it is  
guaranteed to revolutionize the  
Norwegian media industry"**

- user

# Introduction

Imagine you're a journalist working at NTB, having to write hundreds of almost identical articles every time new data is published. Then new data is published every week or even every day, and so you have to write a hundred more. The same data, the same words. Slightly different numbers and regions. During the pandemic, statistics about the number of covid-19 cases were written and published every day. But NTB had help from an automated text generator – a robot journalist.

# Our solution

Now let's say you have to write hundreds of new articles every single day, but the only thing you need to do is to push a button. Based on one data source, new articles are generated, for county, down to municipality – or even postcode. Let us introduce you to NTB Byline, an automatic article generator for journalists at NTB. Byline elevates the basic tool that was used to generate covid-19 articles, enabling journalists at NTB, and in the future, all of Scandinavia, to generate hundreds or even thousands of automated articles from just one data source. Freeing journalists from the mundane data-driven article-writing, and empowering them to do the independent, investigative long-form journalistic work that drives society forward.

Our prototype takes the user through the journey of generating robot articles from start to finish. Byline allows journalists to choose datasets, edit the automatically generated articles and produce hundreds of articles that are ready for publishing within a few minutes. This tool streamlines journalistic work and helps journalists save time on articles with large amounts of data. Byline is a tool for all journalists regardless of their technical competence, and the prototype is therefore made as self-explanatory and easy to use as possible.

# Background

NTB is Norway's leading provider of text, images, video and graphics to the Norwegian media. Every day, NTBs journalists and photographers deliver editorial content to nearly 200 media outlets (NTB, n.d.). At the start of the semester UiB assigned us to work with NTB. They wanted to develop a tool that could generate hundreds of articles based on a single set of data and a push of a button. A tool that would offer produced texts and articles granulated down to a micro-level. These articles would solve their customers' need for personalized content, and the tool would be based on AI, machine learning, language processing, and automatization. The goal is that Byline will create value for NTB as it would drastically improve efficiency in-house, making journalists able to generate articles at a rate never done before. The vision is that Byline will be the media tool of the future; an in-house standard for all media houses in Scandinavia, licensed by NTB.

## Tools

**Trello** for delegating tasks

**Zoom** for online meeting with NTB

**Slack** for fast and continuous communication with NTB

**Figma** for prototyping, design and making presentations

**Google drive** for writing reports, planning, file storage and notes

**Miro** for planning SPRINTs and organize feedback from user tests



# INSIGHTS



# Interviews

Before designing anything, we wanted to learn more about our challenge. We conducted six interviews with employees at NTB, where three of them had a journalistic background and the other three were developers working with robot journalism. The goal of the interviews was to gather information about the solution we were going to develop, and to get the insiders' perspective, ideas and thoughts.

Through the interviews we learned about some of NTBs similar projects, "Boligroboten" and "Fotballroboten". These are both tools based on software that automatically generates text, respectively real estate articles and sports reports. We got valuable information about how these text generators were created, and it helped us understand the mechanics and backend of the tools similar to the one we were going to design. The interviews with the journalists helped us understand what kind of tool they wanted: something familiar, easy to use, and not too technical. With this in mind, we began building a tool that is both possible for NTB to develop and that meets the needs and wishes expressed by their journalists.

# GOOGLE DESIGN SPRINT



# Design sprint

In five days we completed the Google Design Sprint. We did the following exercises:

## Day 1

- Field work review and note taking
- HMWs
- 2 year goal
- Sprint Question
- High level map
- The 4-step sketch

## Day 2

- Concept heat map
- User test flow
- Storyboarding
- Find users for testing

## Day 3

- Prototyping

## Day 4

- User testing

## Day 5

- Summarizing Sprint findings

# Design sprint

Google Design Sprint is a process where in five days you define the challenge, make a prototype, then test it and the idea on its intended users. This gives us the opportunity to understand if our idea is good, before we develop it further (Knapp et al., 2016). We conducted our first Google Design Sprint at Media City Bergen together with the decider from NTB. On day 1 of the Sprint we defined the challenge and produced a mass of solutions. We came up with our two year goal:

**In 2 years, this tool will be the industry standard for automated journalism in Scandinavia.**

At the end of the day we completed the four step sketch and every person made a solution each. On day 2 we voted on the best solutions and defined the prototype with a storyboard.

## Sprint questions

We found three main Sprint questions that we wanted to focus on to reach our two year goal. The Sprint questions were chosen by our decider at NTB.

Can we create a product that can be used by everyone regardless of competence?

Can we let the user develop and customize the tool to meet their needs?

Can we present data that makes it easy for the user to understand what the numbers mean?

# USER TESTING



# User testing

The first iteration of the prototype got tested by four users. This prototype was low-fi and not fully functional, but it had a few elements the user could interact with. It included a set of four pages that users had to go through in a predetermined way. Even though NTB Byline is a tool for NTB journalists, we approached experienced journalists and journalism students at Media City Bergen to conduct user testing and receive valuable insights from people within the field.

I'm sceptical of this idea. I'm scared that robots will take over our jobs. Only humans have the ability to be journalists.

- user

This was a common first reaction from the journalist when doing the first onboarding. While initially scared of change and the fact that a robot might take over their jobs, all of the journalists that tested the prototype changed their minds after we explained the vision in more detail.

# If you can make this work, it is guaranteed to revolutionize the Norwegian media industry

- user

This is a quote from one of our users after testing our prototype and it relates perfectly to our challenge and two year goal.



# Feedback

We organized the user test feedback in Miro by creating an affinity diagram. This is done by sorting out the information into groups of similar items and categories (Thornton, 2020). We mapped the positive and negative feedback as well as user ideas and comments.

## **Our most important feedback from the first iteration was:**

1

A tool like NTB Byline would save journalists a lot of work

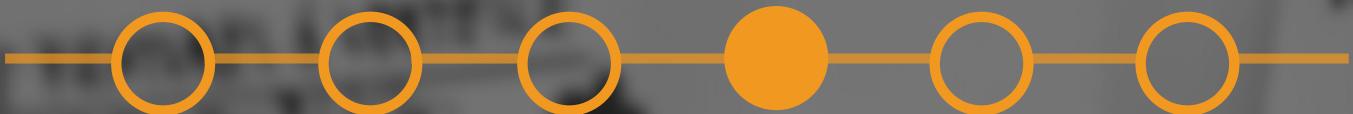
2

They mentioned that with this tool journalists can spend more time on one case, rather than spending a long time writing many short articles.

3

They all expressed initial concerns about robot journalism as a field, and were afraid that this would affect the integrity of the article.

# ITERATION



# Iteration

After completing user testing on the first iteration of the prototype, we were left with a lot of valuable feedback. All of this feedback was in our mind when we started on the next phase, the second iteration.

## Iteration Sprint

Our goal for the iteration sprint was to review user feedback and iterate on this. We started the workshop by presenting the first iteration of the prototype to the two deciders that joined us from NTB. We caught them up to speed on the choices we made regarding the prototype and informed them on the feedback we got from the user testing. Then we voted on three questions that we believed were the most important to iterate on in the upcoming days:

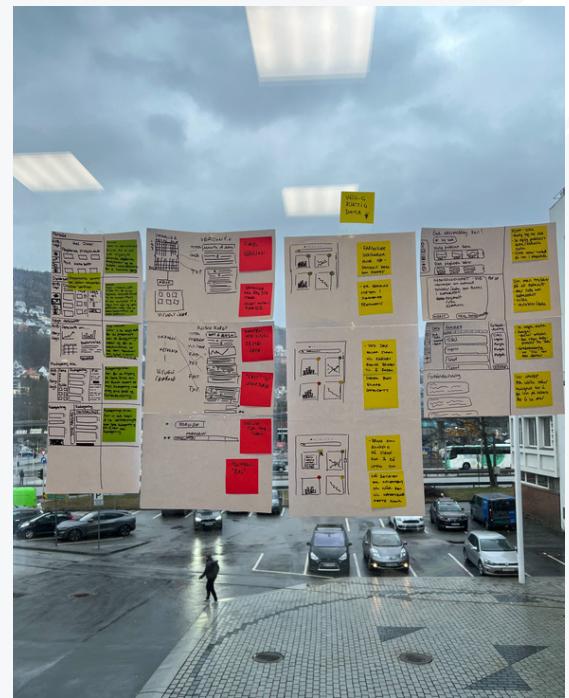
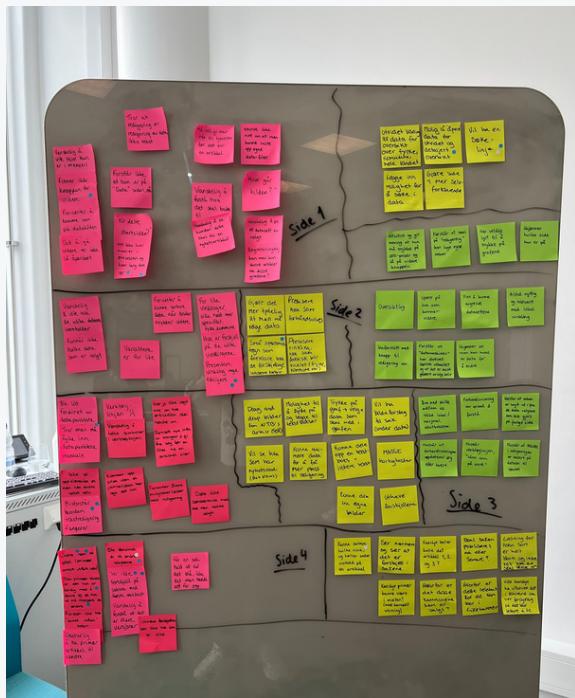
Can we validate that it's easy for the user to see where you are in the process and what steps remain?

Can we validate that the editing page gives journalists the opportunity of seamless and intuitive editing?

Can we validate that the user understands the contents of the data source?

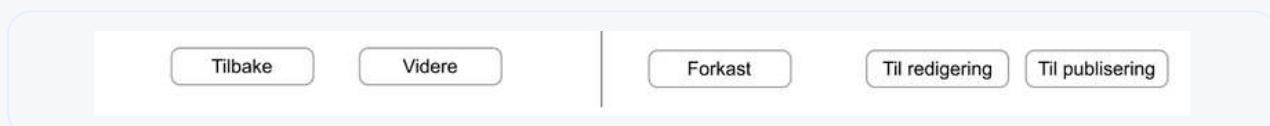


We once again completed the four step sketch where we made new suggestions of possible solutions and voted on the best ideas. Finally, we each made a user test flow and voted for the best one. This workshop gave us a good foundation to get started on the second iteration of the prototype.



# Changes from the first iteration of the prototype

The first iteration of the prototype had quite a lot of pages. The user had to click through a lot of steps to get to the publish page, and we got feedback that this was a bit confusing. We had a lot of buttons at the bottom of the page, some of them meant the same and confused the user (see picture under). Both the number of buttons, which were too many, but also their names and placements confused the users while testing this iteration.



We had also added a toolbar at the top of the page, and this was not confusing: this was invisible (see picture under).



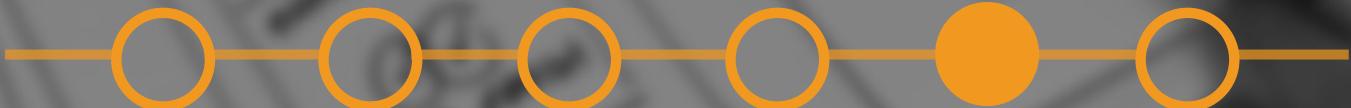
Not one of the users testing this iteration noticed the toolbar at all. We had to tell them it was there. When we told them, they actually quite liked it, but said that most journalists already know all of these symbols' shortcuts, and also that the placement was too "hidden". Lastly we had the "Data & vinkling" where the users were supposed to check off what data they wanted to use in the article. The phrasing confused the users a lot, and one even said that it didn't look like they could choose more than one.

Hvilke data ønsker du å bruke i saken?

Tilgjengelig data:

Alder     Pris     Område  
 Periode     Tid     Årstall

# PROTOTYPE

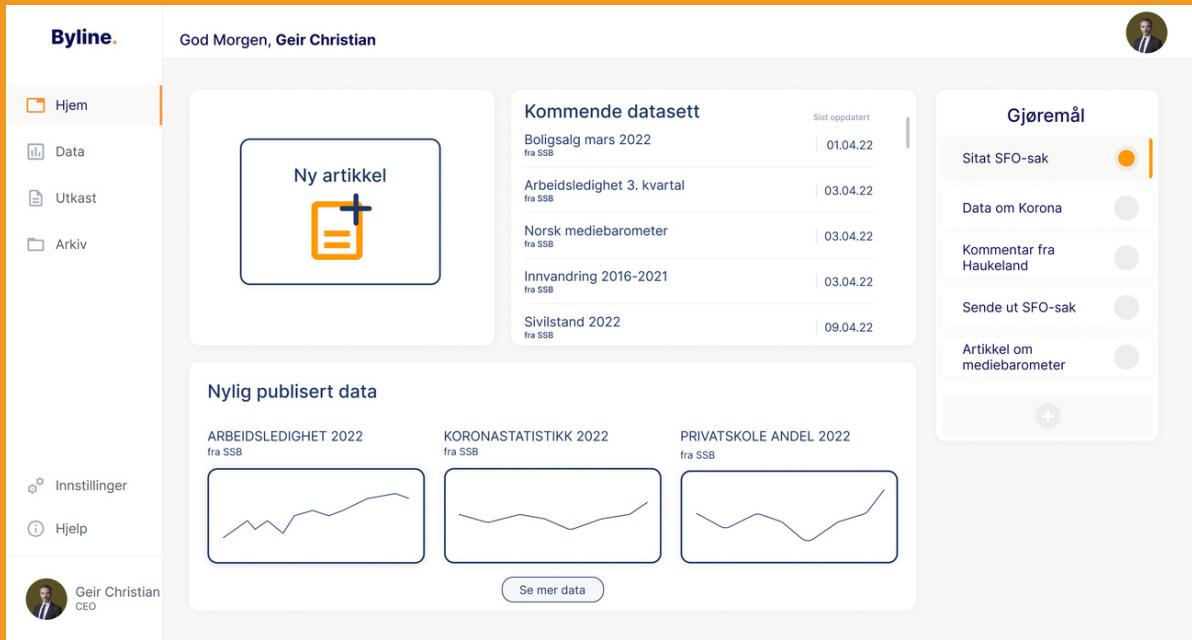


# Prototype

We will now show you our final prototype of NTB Byline. It consists of a home page, data page, editor, preview and archive page.



# Home page



This is the home page of our final prototype. We've made the "call to action" button, "Ny artikkel", quite big and attention-grabbing so that the users are quickly drawn to it. This also creates an obvious starting point for the users. It was confirmed during the user tests that this worked as intended, and they all expressed the urge to click on the button.

We have also added a selection of datasets; upcoming data and newly published data. These should be the most relevant datasets for the users. By clicking on the headline or the graph, the users are able to see the data in more detail and also create an article from it.

# Data page

Below you can see the datapage where the users will find all available datasets. We made a navigation bar at the top, where all the datasets are categorized. The users have the ability to search for specific datasets. There are also options to filter and sort the datasets for a fast and precise way to find the data in question. You can sort by publication date, most frequently used datasets, the length of the datasets as well as filter by area and time period. The users can switch between a list view or a more visual view with graphs as seen in the picture below. Right next to the sort button is the “Last opp” field, where you can upload your own datasets to use.

The screenshot shows the 'Databanken' interface. On the left, there's a sidebar with icons for Hjem, Data, Utikast, and Arkiv. The main header has categories: Arbeid, lønn og utdanning, Befolknings og bolig, Helse og samfunn, Miljø og transport, Næringsliv og teknologi, and Økonomi. Below the header is a search bar with placeholder 'Søk etter data her'. To its right are buttons for 'Filtrer', 'Sorter', and 'Last opp'. Further right are two grid icons. The main content area is titled 'Nyeste datasett' and displays six cards:

- Arbeidsledighet 2022 fra SSB (line graph)
- Koronastatistikk 2022 fra SSB (line graph)
- Boligsalg januar 2022 fra SSB (line graph)
- SFO-Priser 2021 fra SSB (line graph)
- Privatskole andel 2022 fra SSB (line graph)
- Mest populære navn 2021 fra SSB (bar chart comparing GUTTER and JENTER)

At the bottom left is a 'Tilbake' button, and at the bottom right is a small portrait of a person with the name 'Geir'.

# Editor

The screenshot shows the 'Editor' page with a light blue header containing the word 'Editor'. Below the header is a large orange section with a wavy border. On the left side, there is a sidebar with a dark blue background and white text. It includes sections for 'Byline.', 'Data' (with two line graphs: 'Innleggelsjer nasjonalt' and 'Antall smittede nasjonalt'), 'Datapunkter' (with buttons for 'Geografisk område', 'Antall smittede', 'Antall innleggelsjer', and 'Helseforetak'), and 'Bildeforslag' (with three image thumbnails: a virus model, medical supplies, and a hospital building). The main content area has a white background and features a title '1531 nye smitta i Noreg' in bold blue text. Below the title are two boxes: 'Ingress' (containing text about new cases) and 'Tekst' (containing text about patients in Voss). To the right of these boxes is a vertical toolbar with various icons for editing. At the bottom right of the main content area is a button labeled 'Til forhåndsvisning'.

Then we have the editor page, where the user can upload data from a dataset and edit the generated text. On the left the user can see two small graphs, the data points and image suggestions. In the middle there are boxes in which the user can edit the paragraphs, add new ones or delete unwanted ones. We added the tool bar next to the editing column to make it more visible for the user. The positioning of the tool bar also works as a divider between the text editor and the article preview. At the far right side of the page the user can watch the preview of the article. The users wanted easy access to suggested images, easy editing-possibilities, paragraph-boxes and drag and drop possibilities to change the order of the paragraph-boxes. We wanted to make sure our product was familiar to the user by following industry conventions in line with the usability principle of consistency and standards (Nielsen, 2020).

# Preview

The preview page is where the journalist can see a preview of the main article along with two articles for the county and municipality. This is just a preview of one of many articles generated, 11 for county and 356 for municipality. By pressing the reload button (↻) the user can see more examples of articles and also edit them if needed. If you are looking for a specific area, the user also has the ability to find this by using the search bar.

# Archive

The image shows two screenshots of the NTB Byline Archive interface. The left screenshot displays the 'Nyeste artikler' (Latest articles) section, which includes a search bar, filter options, and three cards for 'ARBEIDSLEDIGHET' (Unemployment), 'BOLIGSALG' (Real estate sales), and 'SIVILSTAND' (Civil status). The right screenshot shows a similar layout for 'Nyeste artikler' (Latest articles) under 'ARBEIDSLEDIGHET', with a total of 368 articles, and other sections for 'Eldre artikler' (Older articles) and 'BIL SALG' (Car sales).

This is the archive where users can see all the articles generated by NTB Byline. They can also see how many articles have been generated for each geographical area and for different topics such as unemployment or car sales. The idea with this page is that NTB-journalists can retrieve articles that have been written, and edit them according to their needs, or use them as templates for future datasets. Our hope is that journalists from for example BT can retrieve relevant articles as well.

# EVALUATION



# Recommendations 19

There is no doubt that NTB Byline will be a challenge to develop because of the complex backend programming. We recommend that NTB develop the article generator step by step and start with the most basic parts and then add to the code as the work progresses. As a group we discussed making another prototype version for the local journalists' point of view. This would look slightly different than NTB Byline because it would be from the retrieving side, rather than the "make an article" side. If NTB is going to reach their two year goal of becoming the industry standard for automated journalism in Scandinavia, we believe it's beneficial to user test Byline on NTB journalists as well as other journalists. NTB would then have the potential to see if this type of tool is viable, desired and could be profitable among other news outlets in the Scandinavian media industry.



We have discussed a couple of possibilities for further development of NTB Byline. Firstly we would look more at personalizing the landing page for each individual user. Additionally, we want to make it possible for all users to choose how advanced Byline can be. For example, technically advanced or power users could have the opportunity to look more deeply into the different datasets as well as edit the code if needed. Lastly we would see how we could improve the display of different types of data or datasets to make it as intuitive and understandable as possible for the users. All of this is something it would be interesting to look at in collaboration with NTB and for NTB to take into account when developing this tool.

# Lessons learned

Through this semester we have learned a lot from working together in our group, from the work we have done and from NTB. Being able to work together in person, both in our group but also together with NTB, has been beneficial for our project. We got the opportunity to go to NTBs offices in Oslo to conduct interviews. This allowed us to ask follow-up questions, get quick answers and experience personal and in turn very valuable teamwork. Our NTB-contacts also came to Media City Bergen for the two Google Design Sprints. This was our first time planning, conducting and facilitating a Google Design Sprint with an outside company. We learned how important it is to plan and prepare for the sprint, the importance of explaining the tasks so that everyone understands how to do it and to stick to the schedule.

When conducting the user test we got to experience the importance of a good user test guide. In our first user test, we did not explain the concept well enough to the users at the beginning of the test. This caused some of our first user tests to not be as successful as they could have been, and we did not get as much useful insights from these first tests as we could have. We learned that trial runs are essential to avoid mistakes so that users don't misunderstand or become insecure during the user test. This enables us to retrieve more valuable feedback.

After completing the user test, we found that there were differences between what the users want from the tool, and what the company wants the tool to do. This was taken into account when designing NTB Byline, as we wanted it to be useful for both parties. We learned that we shouldn't be afraid to contact the company if needed. We are doing a job for them so we are not bothering them if we ask for questions or help.

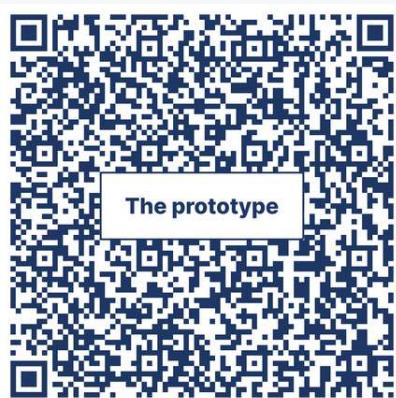
# Concept Conclusion

When first introduced to an automatic generator such as NTB Byline, journalists were skeptical. By learning more about the use of such a tool it became apparent that it was actually both wanted and needed by journalists in terms of creating repetitive articles that include a lot of data. The concept behind NTB Byline is not meant to take away the journalists' jobs, but rather to save time and enable them to focus on storytelling and complex journalism.

If NTB is to reach their two year goal of this tool becoming an industry standard in Scandinavia they still have a long way to go. Challenges include improving the AI by implementing natural language processing for it to become applicable to news outlets outside of Norway, and providing it with enough data and training so that the program is able to write full length articles on its own. Although many challenges will arise when developing this tool, we see the potential of NTB Byline to become a game changer for the field of journalism and the media industry as a whole.

## View the prototype

Click the QR-code or scan it to view the content.



The prototype



Video playthrough

# Literature

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