Pre-Project Report

PERSONAL SUSTAINABILITY ASSISTANT

Bachelor's Thesis spring 2023

MERON BERHE KIDANE
JON PRESTHUS
MIKOLAJ KRZYSZTOF BARAN

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Presentation

We are a group of three students from OsloMet University that have worked together since we started studying “Anvendt Datateknologi” during August 2020. Our names are Jon Presthus, Meron Berhe Kidane and Mikolaj Krzysztof Baran.

Our project is called “Personal Sustainability Assistant " and the purpose of this project is to create a digital assistant in Microsoft Teams that uses several Microsoft APIs to fetch data about the users from OneDrive, SharePoint, Teams and Outlook. The assistant will then use this data to calculate how much CO2 the user is producing through the use of these products.

Our client for this project is Inmeta Consulting AS, a technology consulting company, with Mario Miguel Henriques as our supervisor from Inmeta and Raju Shrestha as our supervisor from OsloMet University.

Inmeta is an IT-consulting firm under the Crayon group that operates in Oslo, Trondheim, Hamar and Bergen, and specializes in data & AI, system development and cloud integration, design and UX, strategy and consulting.

Group Members:

Name	Email
Jon Presthus	JonPre@proton.me
Meron Berhe Kidane	meriva.b@yahoo.com
Mikolaj Krzysztof Baran	mkmbaran@gmail.com

Supervisor at Inmeta

Mario Miguel Henriques

Principal Consultant/Lead Architect

mario.henriques@inmeta.no

Supervisor from Oslomet

Raju Shrestha

Associate Professor
raju.shrestha@oslomet.no

Summary

Our client, Inmeta, has given us a project to work on during our bachelor's thesis. This project involves creating a personal assistant in Microsoft Teams that uses data collected from various Microsoft services to calculate the amount of CO2 each employee, department and company as a whole produces.

We will achieve this by utilizing Microsoft Graph APIs. Microsoft Graph is a service that allows collection of data from all Microsoft 365 services and platforms. This includes Microsoft Teams, Outlook, SharePoint and OneDrive.

Inmeta has given us this task because of the growing concern surrounding sustainability. Companies produce, more than ever, large amounts of data (Chan, 2020) and this data needs power to be stored and transported around the Internet. What we hope to achieve with this assistant is to allow each employee to have greater control around their data usage but also serve as a learning/awareness service. This will be done by giving feedback to each employee about unused files, running sites that are not used and amount of emails sent.

For this project we are going to use .NET C# as a back-end programming language, which will be used to develop the algorithms to calculate the amount of CO2 emissions that are produced by the users. In the front-end, we will be mainly using Typescript as well as a combination of Power Platform and Power BI from Microsoft Apps to visualize the data we collect.

The current situation

In today’s world, and more than ever, companies produce a large amount of digital data. This data can be in different formats, for example emails, files, sites, meetings, etc.
All this data utilizes energy to be stored and propagated. In most of the cases, some of this data can be, first of all, avoided, but also deleted after some time. This is especially important when the amount of data produced daily by companies is not reused after some time. We believe that bringing awareness of this problem to the end users, together with some actionable tasks, will allow us to create a product that can, first of all, save energy (and carbon footprint), but also, save money to the companies.

Our supervisor at Inmeta, Mario, wants us to build an application that tracks CO2 emissions based on employees' usage of Microsoft programs and services (Teams, Outlook, SharePoint and OneDrive). The reason behind this is that sustainability has become a hot topic in recent years due to global warming and the consequences that come with it. With more consumption comes more emission and we believe that our personal digital assistant can monitor emails, files stored and websites running on the cloud provider to determine how much CO2 is produced through these means. What we hope to achieve through this greater awareness around unnecessary usage of data and electricity by giving feedback to the user about the actions that can be taken to be more sustainability focused.

Inmeta now has a huge focus on the sustainability area, and we have met with the responsible manager at Inmeta (David Aas Correia). David is a key element in all customer projects delivered by Inmeta, making sure all products and services are according to the latest sustainability regulations. He will also be a key element during this project, providing us with feedback and suggestions on how to drive this forward.

Goals and Framework conditions

Our goal for the project is to create a personal assistant in Microsoft Teams that monitors the users/department/companies usage of Microsoft Products like Outlook, OneDrive, Teams, SharePoint and determines how much CO2 is produced through the use of these products. We will use Microsoft Graph APIs ("Microsoft Graph overview - Microsoft Graph" 2022) to pull data from the customer "Tenant" (for this project we will be using Inmeta) and store this data in a database for later use. We are only authorized to use data from Inmeta and no other companies for this project.

Microsoft Graph was created by Microsoft in 2015 and is today one of the most widely used development tools. This set of APIs allow us to reach and gather information from all Microsoft services and platforms, respecting user security, meaning that each user, based on their permissions, are only able to fetch data that they have access to. This tool will be the core of this project, since it will allow us to access the necessary data to power all the functionalities, such as CO2 emissions calculations as well as providing the data for our recommendation engine.

We will mainly use Typescript to create the Microsoft Teams application that will then consume the data gathered from Microsoft Graph (and stored in a database) and also utilize tools such as Power Apps and Power BI from Microsoft to build the reporting/visual component in the UI. The backend process that reads and consumes the data from Microsoft Graph will be built in C# and will be running in Azure Functions.

For the recommendation engine, we will be using a new service in Microsoft Azure, called Azure OpenAI, which is capable of generating recommendations based on the data we will collect, as well as provide good practices and tips to the end user.

We have discussed with our supervisor and he mentioned that the sustainability of AI has become more focused on sustainable data sources and power supplies these past years, and our idea is to allow users to be more aware but also to better understand these issues.

Front- end

- Typescript
- Power Platform
- Power BI

Back-end

- .NET C#
- Azure Functions

Tools

- Visual Studio 2022
- Microsoft Azure
- Microsoft Teams
- Power Platform (Power BI)
- Azure OpenAI
- Microsoft Office
- Azure DevOps

Solutions and Alternatives

We were given certain specifications as to which programs and tools we would be using during the development of the personal assistant. Our supervisor at Inmeta want us to use C# for the algorithms, because his area of expertise falls within .NET and it's the programming language he can help us the most with. We also have some experience with .NET from previous courses so we can make use of that knowledge in this project.

Power Apps is a simple tool for developing apps in Microsoft Teams and uses “drag and drop” features to form the UI. We use this tool as it is integrated into Microsoft Teams and will make it easier for us to develop a front-end for the application combined with Typescript. By using Power Apps we can design a responsive application which is friendly for users and can smoothly run in the browser and all desktop and mobile devices. In addition, the data is stored either in the underlying data platform Microsoft Dataverse or in various online and local data sources, such as Microsoft 365, SQL servers, SharePoint etc.

If we have enough time at the end of the project, we will also integrate this service with Azure OpenAI into the personal assistant. The purpose will be to read data collected from each user and give actionable tasks as well as bring awareness.

Since users are typically more focused in delivering customer projects than other tasks, sustainability is always on a second priority. We know that this is an urgent and very important topic that will be a major concern in the very near future. We believe that gamifying this sustainability service, will allow us to trigger more awareness from the users, as well as make it funnier to interact with. For that we plan, if there is time, to create a simple game (such as a pixel art game), where we allow users to “compete” against each other, to reach some goals defined by the company.
The main goal is to have the companies set own goals, such as CO2 footprint reduction by 20% in 3 months, and allow users to compete and collaborate for the overall goal, by reducing their own footprint.

Analysis of impact

- A .NET solution, built to run in Microsoft Teams platform (desktop and mobile), should work optimally within Inmeta's existing dev environment, be immediately comprehensible and ready for use
- Power Apps simplify the development process and will make it easy to document and, in the future, utilize the solution as a foundation to build further and integrate it into larger scale projects
- The gamification of the application can be repurposed in future works as an efficient and fun motivational tool for various other applications or companies. It will promote healthy competition between peers and/or departments.
- Users of the Teams Application will have a greater control and awareness around their own CO2 emissions.

Work- and progress plan

Our Bachelor project is scheduled for 19 weeks until the end of May 2023, with our tasks split into 10 sprints (each sprint with 2 weeks duration). The initial two sprints will revolve around planning and the gathering of data from Microsoft Graph as well as creating the Teams application to be used by our personal assistant as well as data visualization. The second set of sprints will focus on storage, organizing and processing the data. Following that, the third set of sprints will focus on utilizing OpenAI to read the data and calculate the carbon footprint of each user/department/company, and what can be done to reduce it in the future. The final two sprints will focus on reporting the results of the application and the overall project period.

Sprints	One		Two		Three		Four		Five		Six		Seven		Eight		Nine		Ten	
weeks	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	21	22	23
Starting project																				
Make a plan																				
Meeting																				
Data gathering																				
Data storage																				
Developing																				
Unit test																				
user testing																				
Documentation																				
Report																				
Logging																				
Presentation																				

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