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Enhancing Small Business Sales Operations Through Generative AI Powered Automations

A Case Study at GMCOLAB

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Fait à Bruxelles, le 17/08/2024

Signature Marco Villanueva Legler, 190869

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Introduction

Artificial Intelligence (AI) has emerged as a transformative force, reshaping industries and becoming a critical factor for the future viability of companies worldwide. The question is no longer whether AI will render certain businesses obsolete but rather when. Those companies that fail to adopt and integrate AI into their operations risk being outpaced by more agile competitors. This challenge is not distant; it is already affecting businesses of all sizes. The case for larger companies to adopt AI is more standardized and documented, while for small and medium-sized enterprises (SMEs), the approach to AI adoption is often more case-specific, requiring tailored strategies to meet their unique needs. This raises an important question: How can SMEs effectively leverage this technology to not only protect themselves from the impending wave of AI-driven disruption but also to potentially thrive through successful AI integration?

GMCOLAB, a consulting and development firm specializing in generative AI solutions, is addressing this challenge directly. Recognizing the potential of generative AI in transforming business operations, GMCOLAB shifted its focus towards consulting and developing AI-driven automation solutions specifically designed for SMEs. This strategic direction allows the company to explore and develop AI solutions that are not only innovative but also practically implementable for businesses with limited resources.

To successfully navigate this new direction, GMCOLAB is committed to continuous research, exploration, and testing of the latest AI tools and applications, ensuring they are both practical and beneficial for SMEs. The central research question guiding this thesis is:

"How can generative AI-powered automations enhance small business sales operations?"

The findings of this research will be pivotal not only for GMCOLAB's strategic direction but also for other SMEs looking to integrate AI into their operations.

A unique aspect of GMCOLAB's approach is its internal testing of AI products before commercialization. This means the company acts as its own client, gaining deeper insights into the needs and challenges of its actual customers. This self-reflective practice enhances GMCOLAB's ability to tailor solutions that meet the specific demands of SMEs.

GMCOLAB is currently in a period of strategic evolution. The company is focusing on refining its market position, with an emphasis on exploring and developing AI solutions that can be practically implemented by SMEs. This thesis aims to provide a comprehensive overview of the exploratory and testing phase of new AI products, with a particular focus on sales automation for SMEs. Starting with limited resources, a clear incentive, and an uncertain path ahead, GMCOLAB's journey through opportunity exploration, tool testing, solution development, and evaluation has resulted in three distinct projects, each contributing valuable insights into the practical applications of generative AI.

The first project, **Lead Generation and Customer Segmentation on LinkedIn**, leveraged generative AI to enhance GMCOLAB's LinkedIn engagement, improving client interaction through automated workflows. The second, **Content Repurposing**, focused on automating the transformation of existing content into various formats, significantly supporting marketing efforts. Finally, the third project, **Customer Service Emailing Automation**, involved automating customer service emails, saving considerable time and improving the accuracy and efficiency of client communications.

This thesis is structured as follows: The first section provides context by presenting GMCOLAB and a review of the current literature on generative AI in sales and marketing. It also addresses the ethical considerations and risks associated with AI implementation, particularly for SMEs with limited resources. The second section delves into the three projects, detailing their strategies, methodologies, and outcomes. The final section critically evaluates the projects, assesses their utility, and discusses future perspectives on AI integration in SME operations.

The goal of this thesis is not only to answer the central research question by presenting the projects and their results but also to provide lessons learned and practical tips for anyone interested in developing AI-driven automation solutions.

Part 1: Presentation of GMCOLAB and Projects Contextualization

GMCOLAB was established in March 2020 by Gabriel Mattys, who left his previous employment with a vision to leverage technology for innovative real estate solutions. The company initially focused on the development of web scraping software, marking its entry into the technology sector. Early in the company's journey, Andrew, a key freelance developer, began contributing to the project. Due to the success of their collaboration, Andrew formally partnered with Gabriel.

In its early stages till 2023, GMCOLAB secured clients primarily through Upwork, a platform that connects software developers with clients seeking technological solutions. At the beginning of 2023, with the rise of artificial intelligence, the company shifted its focus toward integrating Generative AI (GenAI) into various solutions and began developing a Software as a Service (SaaS) product. By the end of 2023, the company faced increased competition on Upwork, and the development of their product was progressing slower than anticipated. During this time, GMCOLAB was invited to present their work at a seminar, which led to several key realizations:

- The Flemish market is significantly less competitive.
- There is a substantial demand for high-quality content presentation among SMEs.
- Such seminars provide an excellent opportunity to meet potential clients and demonstrate technical expertise to those interested in developing initiatives within their own companies.

1. Activities, Products, and Client Engagement

GMCOLAB currently offers a diverse array of services, ranging from comprehensive consulting to the development of sophisticated software automation projects, encompassing both AI-driven and conventional software solutions. The company places considerable emphasis on educational initiatives, including seminars and webinars led by Gabriel, which aim to elucidate the role of generative AI and its potential applications in contemporary business practices for entrepreneurs and managers across various sectors.

GMCOLAB's Strategic Directions:

1. **Generative AI Consultation and Training for Businesses:** GMCOLAB conducts seminars and one-on-one consulting sessions specifically tailored for business executives and managers, with a focus on integrating generative AI and ChatGPT into business operations. These events are meticulously structured to provide actionable and comprehensible guidance on leveraging AI technologies. Participants gain insights into both the potential and limitations of AI, exploring strategic applications through these seminars and personalized consulting opportunities. These sessions, held at prominent locations across Flanders and Brussels, are designed to equip business leaders with the essential skills and knowledge required to effectively implement AI within their organizations.

2. **In-House Development of Software for Direct Consumer Sales:** GMCOLAB actively develops and markets innovative solutions, such as transcription tools and real estate messaging bots, which have been identified as key sources of recurring revenue. These products highlight

GMCOLAB's adaptability and expertise in creating versatile technologies that enhance business operations.

3. **Development of Custom Software Solutions for Third Parties:** Since its inception, GMCOLAB has focused on creating custom software solutions for clients. The company works closely with clients to design systems that are tailored to their specific needs, are easy to implement, and meet high standards of quality and scalability. This approach shows GMCOLAB's dedication to providing value through both their own products and custom software development services.

2. Available Resources and Operational Agility

GMCOLAB operates with a highly agile and flexible model, enabled by a remote workforce and their dynamic company culture. This approach is facilitated using SaaS solutions for collaboration, such as Google Workspace, and video conferencing platforms like Zoom and Telegram, which ensure effective communication. This methodology supports GMCOLAB's innovative projects and consulting services, allowing for rapid adaptation to client needs and technological advancements.

3. Market Positioning

Cost-Effective Development: GMCOLAB offers high-quality services at competitive prices by employing most of its team in Eastern European countries like Ukraine, Georgia, and Greece. These locations have lower salary costs than Western countries, enabling GMCOLAB to reduce costs while maintaining high service standards.

Targeted Client Base: The company primarily serves clients in Western countries, taking advantage of the wage gap between East and West, and more generally since the end of 2023 the Flemish market that requires the active presence of Gabriel but that is even more rewarding and less competitive.

Project-Specific Differentiation: For internal projects, GMCOLAB's approach to differentiation varies. While there is no uniform differentiation strategy across all products and services because of the variety of services that it offers, the company benefits from strong teamwork and synergy within its skilled team.

Investment in Innovation and Community: GMCOLAB is committed to investing in innovative projects and creating a community around its brand. This approach not only highlights the company's technical skills but also underlines its focus on building sustainable, long-term relationships with clients through educational initiatives and personalized consulting.

4. Team Overview and Composition

At GMCOLAB, the organizational structure is informal and agile, suited to the fast-paced environment where three of the five team members work as freelancers from different countries.

Communication Methods

Communication within the team mainly occurs through instant messaging and regular video calls, ensuring strong team coordination and quick responses. The adoption of video tools like Loom[1] has

[1] Free online screen recording tool https://www.loom.com/

been implemented, leading to notable improvements in our methods of information sharing and enhancing mutual understanding within the team.

Daily Coordination

Gabriel was leading the team and managing daily operations. He was holding a morning call at 9 am every day to review tasks and set the day's agenda, considering the one-hour time difference with some team members. This routine benefited from our video communication, making our daily meetings clearer and more dynamic.

Role and Collaboration

During the internship, Gabriel was my main contact and oversaw key areas like sales, negotiations, client outreach, and communications. He also decided the strategic direction of the company, choosing between developing our own products or working on projects for external clients. I was working closely with Killian Doucet, who started his internship three months ahead of me. This partnership has enhanced our ability to divide tasks effectively during meetings and to tackle more complex problems.

Team Dynamics

Working with Killian has allowed for a productive exchange of knowledge and skills, making our work more efficient and enabling us to take on larger projects. Daily meetings usually involve Gabriel, Killian, and myself, which helps streamline our processes and manage projects flexibly. This teamwork is crucial for quickly adapting to new opportunities and maintaining effective project coordination.

Composition

- **Gabriel, CEO & Founder:** The team was led by Gabriel, the CEO and founder, who handled client relations, business development, and took on the role of sales lead. He was responsible for turning the company's vision and strategy into daily operations. Besides being the leader, Gabriel was my main advisor and mentor, focusing on practical learning. He encouraged me to learn from real-life experiences and to understand my own mistakes.
- **Ann-Sofie, Communication Expert:** Ann-Sofie was announced as the new assistant of Gabriel at the end of the internship period. She has a strong background in sales in the Flemish market, as well as excellent communication and management skills.
- **Andrew, CTO:** As the chief developer, Andrew oversees technology integration and leads the development team, aligning tech resources with company goals.
- **Greg, Software Engineer:** A full-stack engineer, Greg collaborates with Andrew to develop and maintain the company’s tech systems.
- **Natali, Assistant:** Natali coordinated daily tasks and ensures smooth operations, supporting overall team efficiency. Natali stopped working for GMCOLAB in February 2024 as the company shifted its focus to the Flemish market, and her role was no longer needed.
- **Killian, intern:** During his internship, Killian focused on the marketing and business strategy side of things. He started and ended each project cycle by talking to clients and figuring out their needs, planning how our AI solutions could help them. He completed projects by assessing how well the solutions worked and whether they effectively boosted productivity, particularly in small and medium-sized businesses.

- **Marco (myself), intern:** As for me, my internship was more centred on the technical aspects. I worked on designing, developing, and testing GMCOLAB's AI solutions, mainly focusing on automating workflows, all while making sure these systems worked smoothly and met our technical standards.

Collaboration between interns: Our roles complemented each other effectively. While Killian managed client relations and overarching strategy, I focused on the technical implementation and ensured everything functioned properly behind the scenes. This division of responsibilities allowed us to comprehensively address all aspects of our projects, ensuring they were practical, efficient, and met the required standards.

5. Strategy and Financial Impact

The decline in GMCOLAB's revenue in 2023 compared to 2022 can be attributed to several key factors, primarily centred around the strategic decisions the company made during this period (Bizzy, n.d.). As competition on platforms like Upwork intensified and barriers to entry in AI development lowered, GMCOLAB recognized the need to reposition itself within the market. This led to the launch of the ambitious Novelevate project, which aimed to develop a software solution that would allow users—particularly parents or authors of children's books—to create personalized children's books quickly and easily. By leveraging generative AI technology for both images and text, Novelevate sought to enable the production of custom-made books within minutes.

The Novelevate project was not just a venture into a new product line; it also represented GMCOLAB's attempt to deepen its technological expertise and create new revenue streams. However, the project faced significant challenges. The effort required to develop a market-ready version of the software was underestimated, and the company struggled to generate sufficient interest from the target audience. These challenges led to the eventual abandonment of the project, which had already consumed a significant portion of GMCOLAB's cash reserves. As a result, the company experienced a period of financial strain, with several months passing without any new cash flow, contributing to the revenue decline seen in 2023. (More detailed financial information is available in Appendix H.)

However, the situation began to change in March/April 2024. Following the difficulties encountered with Novelevate, GMCOLAB made a strategic pivot to ensure its sustainability. Gabriel identified an opportunity in the relatively uncompetitive Flemish market, which not only had a higher purchasing power but also a growing demand for AI implementation. Leveraging the expertise gained from the Novelevate project and their broader understanding of generative AI, GMCOLAB redirected its efforts towards this market. This shift allowed the company to tap into new revenue streams, leading to a significant rise in financial performance from March/April 2024 onwards. The strategic refocus on a more promising market and the application of the lessons learned from previous ventures were instrumental in reversing the financial decline and driving renewed growth for GMCOLAB.

Part 2: Literature Review

1. Research Contextualization

GMCOLAB's strategic shift towards leveraging generative AI mirrors a broader trend in the attitude of SMEs towards AI. The case of GMCOLAB presents a compelling opportunity to confront the past and current theoretical suppositions and findings within the academic literature with a unique firm that not only explores generative AI technologies for efficiency purposes but more importantly as it is their value proposition. This inquiry is critical for understanding and optimizing AI integration within their business model.

Generative artificial intelligence has rapidly emerged as a transformative technology across various industries, significantly impacting how businesses operate. Kanbach et al. (2023) highlight how tools like ChatGPT, DALL-E, and Jasper have notably lowered the barriers to content creation, enabling even those with limited technical expertise to generate high-quality outputs quickly. This democratization of technology is particularly relevant for GMCOLAB, as it underscores the potential for innovation and accessibility in their offerings. The ability to leverage GenAI to automate the creation of personalized content at scale is a game-changer, especially in marketing and sales, where customer engagement and production efficiency are paramount.

Given the highly competitive nature of the generative AI consultation and software solutions market, GMCOLAB's strategy to create a community around itself is critical. This approach helps build a competitive advantage, ensuring customer loyalty and long-term success. Therefore, understanding the impact, methods, and opportunities of generative AI in business and sales is imperative for GMCOLAB to excel in their operations and maintain credibility.

Exploring the benefits and use-cases of generative AI in business and sales operations is essential for GMCOLAB not only to improve their own sales operations—such as lead generation, customer service, and marketing—but also for their product and service research and development. Insights into successful implementations can guide how generative AI enhances sales processes, providing a better overview of existing tools, processes, and solutions that have been tested and evaluated, informing future product and service development. This is supported by the extensive research methodology employed by Kanbach et al. (2023), who utilized a qualitative content analysis of 513 diverse data points, including academic publications and company reports. This broad and varied dataset underscores the importance of staying informed about the latest technological developments and incorporating diverse perspectives, a strategy that GMCOLAB can adopt to refine its approach to AI integration.

Integrating AI into business processes requires strategic planning and best practices. Effective strategies for embedding AI into workflows address technical challenges and ensure AI systems complement existing operations, enhancing productivity. Companies must be comfortable adopting AI; otherwise, they risk falling behind competitors (EY-Seren, 2024). Developing frameworks and best practices in management to encourage and teach employees to integrate AI into their work is essential.

Addressing risks and ethical considerations is crucial. Understanding associated risks and developing guidelines to mitigate ethical concerns ensures responsible AI implementations that align with industry standards and maintain customer trust (Müller, 2016).

Distrust, alienation, and misunderstanding about AI can threaten GMCOLAB's ability to find customers. Therefore, exploring risks and ethical implications that could negatively affect relationships, operations, and professionalism is important.

Optimizing the synergy between generative AI and human expertise maximizes sales process effectiveness. Researching how AI and human creativity can complement each other helps identify when human intervention is superior and where AI adds the most value. This is particularly important for developing generative AI-powered sales automations. Certain stages in automation require human oversight, and sometimes automations are not viable where human decision-making and professional experience excel. This raises questions such as: When to automate? With or without generative AI? How far should we automate in a specific case? How much human intervention is needed? Is an automation financially or operationally viable even with significant human intervention? When do firms over-automate?

Interactions with GMCOLAB's team and clients reveal that while automating sales processes offers significant benefits, it is also time and resource intensive. Comprehensive research is necessary to fully understand the technology, its real-world implications, limitations, and best practices. This includes strategies for AI integration, training employees, and determining when to rely on human expertise versus AI automation.

2. Introduction

In recent years, the integration of artificial intelligence into business operations has revolutionized various sectors, including SMEs. This literature review examines the impact of AI-powered automations, specifically generative AI, on enhancing sales operations in small businesses. Understanding the distinctions between different types of AI and their applications is crucial for this analysis.

Robotic Process Automation (RPA) is a foundational element of business automation, focusing on repetitive tasks that do not require decision-making capabilities. Examples include automated email scheduling, data organization, and simple calculations. While these automations streamline processes, they do not leverage AI's advanced capabilities. However, when RPA is integrated with AI tools such as image and text recognition, it can manage more complex operations, enhancing accuracy and efficiency in financial management and other business processes (Bi, 2023, p. 38). This "RPA+AI" model allows companies to save on labor costs and reduce errors, enabling staff to focus on high value-added operations (Bi, 2023, p. 38).

With the integration of AI models capable of performing classification and regression operations, automation can address more complex decision-making processes, such as property valuation in real estate or customer segmentation based on diverse criteria. Supervised and unsupervised learning techniques are critical in these applications, allowing models to learn from labeled data or identify patterns without predefined solutions.

Generative AI represents a further advancement, capable of creating new content such as text, images, and sound. According to Bi (2023), generative AI, exemplified by models like ChatGPT, possesses a unique ability to "think" and "create," distinguishing it from traditional AI. This capability aligns well with the creative and logical needs of business management, providing a fresh avenue for problem-solving and decision-making processes (Bi, 2023, p. 36). These models, powered by transformers like

OpenAI's GPT, Google's Gemini, and Anthropic's Claude, offer innovative solutions for SMEs. In sales operations, generative AI can personalize customer interactions, draft tailored communications, and assist in various creative activities significantly boosting efficiency and productivity.

Furthermore, the emergence of the internet, the expansion of social networks, and other technological innovations have profoundly altered commercial strategies and practices. These changes have opened new possibilities while presenting unprecedented challenges. In this context, AI could have a similarly significant impact on commercial activities (Apotheker et al, 2023).

This review aims to explore the current capabilities of generative AI in automations and its integration into SME sales operations. It will address strategies for incorporating AI into business models, ethical considerations, and the balance between AI and human expertise. Additionally, it will highlight the importance of understanding AI's limitations and fostering a collaborative environment where AI and human skills complement each other.

3. Leveraging Generative AI for Enhanced Business and Sales Operations: Benefits and Use-Cases

The implementation of generative AI in business operations offers a range of transformative benefits, especially for SMEs. By examining practical cases, this section highlights how AI-driven automations can streamline business processes, save time, reduce costs, and enhance overall results.

3.1. High-Quality and Consistent Marketing Content

Generative Artificial Intelligence has proven to be a powerful asset in marketing, particularly for startups and small businesses. These tools enable the creation of high-quality, engaging, and targeted content with remarkable ease (Townsend, 2023). Similar to the capabilities noted by Kanbach et al. (2023), GenAI facilitates the generation of personalized content at scale, significantly enhancing customer engagement while reducing production costs. This is especially valuable for SMEs, as it allows them to produce complex marketing materials, such as ad copy, that align closely with customer preferences, thereby crafting emotionally resonant messages that drive customer retention.

Furthermore, Townsend (2023) points out that AI-generated content often matches the quality of content created by human professionals, ensuring that brand voice and consistency are maintained across various platforms, which is critical for businesses seeking to build strong, lasting customer relationships. This corroborates the broader trend identified by Kanbach et al. (2023) where GenAI is leveraged to innovate business models by improving operational efficiency and creating greater value for customers.

3.2. Enhanced Customer Support and After-Sales Services

In customer support, generative AI can automate responses to common queries, significantly reducing response times and increasing customer satisfaction. Both Townsend (2023) and Abousaber & Abdalla (2023) note that AI-powered chatbots and virtual assistants can handle a large volume of interactions, learning from each one to provide more personalized and accurate responses over time. This not only scales support operations efficiently but also frees up human resources for more complex customer issues, while ensuring quick responses to inquiries and 24/7 customer support availability. Additionally, AI supports after-sales services by offering personalized, real-time customer support,

predicting customer issues, and providing tailored solutions, which enhances customer satisfaction and loyalty (Bi, 2023). This proactive approach can significantly improve the overall customer experience and strengthen brand reputation.

3.3. Efficient CRM and Sales Optimization

While not being part of generative AI, natural language processing (NLP) is highly relevant for automating simpler tasks such as sentiment analysis, handling customer inquiries, identifying trends, and managing service campaigns. These tasks can be efficiently managed by NLP models, which provide structured insights. These insights can then be utilized by Large Language Models (LLMs) to generate more relevant, accurate, and personalized content that aligns with the company's strategy, ultimately increasing customer engagement. In the context of Automated Customer Relations Management (CRM), NLP enhances customer interactions by automating operations like ticketing systems and service campaigns, ensuring more precise and personalized responses (Abousaber & Abdalla, 2023).

Moreover, AI enhances sales efficiency by analyzing consumer behavior and generating personalized content that enables sales teams to optimize their strategies. By balancing quantity and quality through AI-driven insights, businesses can make informed decisions that improve sales performance (Bi, 2023). This integration of AI into sales processes allows companies to create quality sales channels and make the most out of customer interactions.

3.4. Automation of Repetitive Tasks for Increased Efficiency

The automation of repetitive tasks is another area where generative AI excels. Tasks such as data entry, report generation, and email management can be automated. This process optimization not only increases operational efficiency but also significantly reduces labor costs (Townsend, 2023). Furthermore, generative AI proves particularly effective in reformatting and translating both structured and unstructured data, automating tasks previously dependent on human repetition (Abousaber & Abdalla, 2023). This capability allows generative AI to streamline and enhance data handling processes, reducing the need for manual intervention and minimizing errors. According to Townsend (2023), the integration of AI in these areas can lead to a more agile and responsive business operation, enabling companies to quickly adapt to changes and improve overall productivity.

3.5. Accelerating Product Development

Generative AI also plays a pivotal role in product development. It can generate design concepts, create prototypes, and optimize existing designs based on current trends and customer preferences. For instance, in the fashion industry, AI can suggest new product designs, while in software development, it can generate code snippets, thus accelerating the development process (Townsend, 2023).

3.6. Streamlining Employee Assessments and Hiring Processes

In addition to these applications, AI can automate employee assessments and hiring processes. AI-assisted techniques can streamline pre-employment assessments and quickly identify candidates with the most relevant skills and experience (Abousaber & Abdalla, 2023). Moreover, AI-enabled bots can assess job applications and accelerate the onboarding process, making the hiring process more efficient (Abousaber & Abdalla, 2023).

3.7. In practice: Generative AI Powered Email and Social Media Marketing

Sahil Bhosale's research on "USE OF RPA FOR EMAIL AUTOMATION WITH SALESFORCE INTEGRATION" demonstrates the significant potential of using RPA and AI for email management. The Intelligent E-Mail Assistant robot developed in the study effectively categorizes and manages incoming emails using AI and machine learning algorithms, reducing the need for manual intervention. For instance, the robot autonomously responds to emails based on their categorized content, enhancing efficiency and control over email management tasks. Bhosale's findings suggest that future enhancements in machine learning and NLP could further improve the accuracy and personalization of email automation, making it even more effective.

This approach is not limited to email automation. Recent studies have shown that generative AI can also be effectively applied in social media marketing, particularly in direct messaging. According to Lee, Hosanagar, and Nair (2013), direct messaging on social media platforms, when crafted with a blend of emotional and philanthropic elements, is highly effective in engaging customers. Their research indicates that persuasive content, rather than purely informative messages, significantly boosts consumer engagement.

Finally, as highlighted by Broekens et al. (2023), LLMs have demonstrated the ability to generate content that aligns with specific emotional tones, making them invaluable in creating persuasive and emotionally resonant messages. By integrating generative AI into email, social media direct messaging, and SMS marketing strategies, businesses can create highly effective campaigns that significantly enhance consumer engagement. These channels have proven effective in boosting customer retention and engagement, leading to higher conversion rates. Integrating generative AI with existing RPA systems further enhances email, direct messaging, and SMS marketing by delivering personalized, emotionally resonant content, ultimately improving marketing effectiveness.

4. Integrating AI into Business Processes: Strategies and Best Practices

To effectively integrate AI into business processes, particularly within SMEs, it is essential to focus not only on the technological capabilities of AI but also on the interactions between professionals and AI tools, specifically LLMs. The success of AI-driven automations relies heavily on how well professionals can utilize these tools to enhance operational performance and align AI systems with business goals. As highlighted by Townsend (2023) and corroborated by Apotheker et al. (2023), implementing generative AI requires careful planning, including identifying key use cases that align with business objectives, assessing the necessary technical skills, and developing a responsible AI framework.

A crucial aspect of this integration is the systematic upskilling of the workforce. Leading organizations, as noted by both Townsend (2023) and Apotheker et al. (2023), are already ahead in this area, ensuring that a significant portion of their employees are trained in GenAI tools. This systematic approach to building internal capabilities ensures that businesses, especially SMEs, can fully leverage AI technologies, even with limited resources. The importance of this is further underscored by the fact that winners in the AI space are those who have invested in upskilling their teams, allowing them to harness the full potential of AI and GenAI.

Moreover, managing the costs associated with AI implementation is essential. Both sources agree that as GenAI adoption increases, so do the associated costs. Companies must be vigilant in monitoring and controlling these costs to avoid unexpected financial burdens as they scale their AI initiatives. Apotheker et al. (2023) particularly emphasize the importance of cost management, noting that proactive management of AI-related costs is a distinguishing factor for successful companies.

Strategic partnerships also play a pivotal role in staying competitive. By building a robust ecosystem of partnerships with AI service providers and technology firms, businesses can access cutting-edge innovations and ensure their AI strategies remain up-to-date. This approach, highlighted by both Townsend (2023) and Apotheker et al. (2023), is particularly beneficial for SMEs, which may lack the resources to develop such technologies independently.

Finally, implementing responsible AI (RAI) principles is not just a best practice but a necessity in the current landscape. Companies that prioritize RAI, especially those with CEO involvement, are more likely to realize significant business benefits (Apotheker et al., 2023). Therefore, SMEs should adopt a responsible AI framework to ensure ethical practices and compliance with evolving regulations.

4.1. In practice: Enhancing Worker Performance Through Generative AI Integration

To reinforce the argument that AI tools can significantly enhance worker performance, particularly within the context of integrating AI into business processes, it is important to highlight the findings of Brynjolfsson et al. (2023). This study offers compelling evidence on how generative AI tools can boost productivity, especially among less experienced workers.

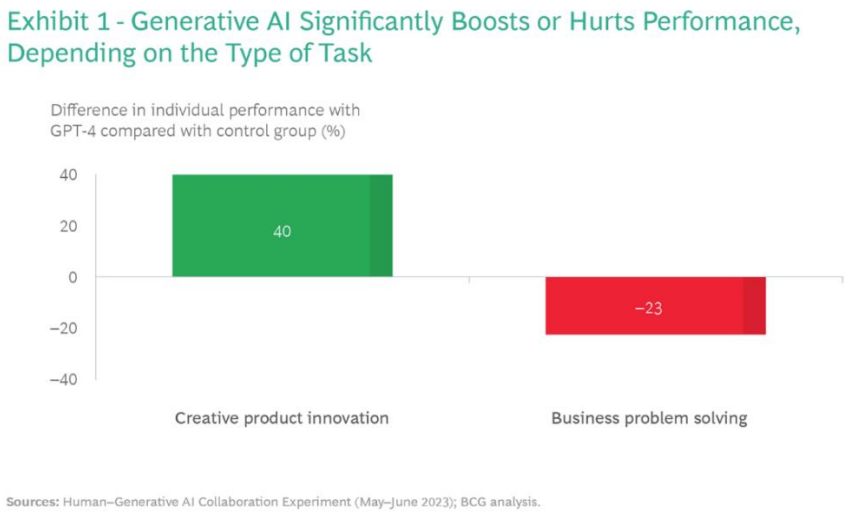
The research by Brynjolfsson et al. (2023) focused on the deployment of a generative AI-based conversational assistant within a large Fortune 500 enterprise's customer support operations. This AI tool, built on a version of OpenAI's Generative Pre-Trained Transformer (GPT) family, was designed to augment customer support agents by providing real-time suggestions during customer interactions. The study observed over 5,000 agents and measured various performance metrics before and after the introduction of the AI tool.

Key findings from the study indicate a 14% increase in productivity overall, with a striking 34% improvement for novice and low-skilled workers. This suggests that generative AI tools are particularly effective in helping less experienced employees perform better, closing the performance gap between them and their more experienced counterparts. The study also found that the AI tool helped new agents move down the experience curve more rapidly, with those using the AI tool for just two months performing as well as non-assisted agents with more than six months of experience.

Moreover, the AI tool not only boosted productivity but also improved customer sentiment and increased employee retention. Customers reported more positive experiences when interacting with AI-assisted agents, and there was a noticeable reduction in requests for managerial escalation, indicating higher customer confidence in the competence of the agents. Additionally, the study suggests that AI tools can facilitate worker learning over time, with agents who adhered more closely to AI recommendations showing sustained improvements in their performance even during periods when the AI was unavailable.

However, it's important to recognize that generative AI can act as a double-edged sword, with its effectiveness varying depending on the nature of the task. For example, research conducted by Candelon et al. (2023) at the Boston Consulting Group (BCG) highlights a paradoxical effect: while the use of GPT-4 improved performance by 40% in creative product innovation tasks, it resulted in a 23% decline in performance when applied to business problem-solving tasks. This underscores the critical importance of context when deploying AI technologies, as their benefits may not be universal across different types of tasks.

Figure 1: Generative AI Significantly Boosts or Hurts Performance, Depending on the Type of Task



Source: Candelon, F., Krayer, L., Rajendran, S., & Zuluaga Martínez, D. (2023, September 21). *How people can create—and destroy—value with generative AI*. Boston Consulting Group. https://www.bcg.com/publications/2023/how-people-create-and-destroy-value-withgen-ai

Furthermore, the influence of generative AI on group diversity of thought is a growing concern. Candelon et al. (2023) observed a 41% reduction in diversity of thought due to AI's homogenizing effect, raising alarms about the potential narrowing of perspectives in creative and problem-solving activities. To mitigate this, it's essential to blend AI contributions with human-driven brainstorming, ensuring that AI serves as a complement to human insight rather than a replacement.

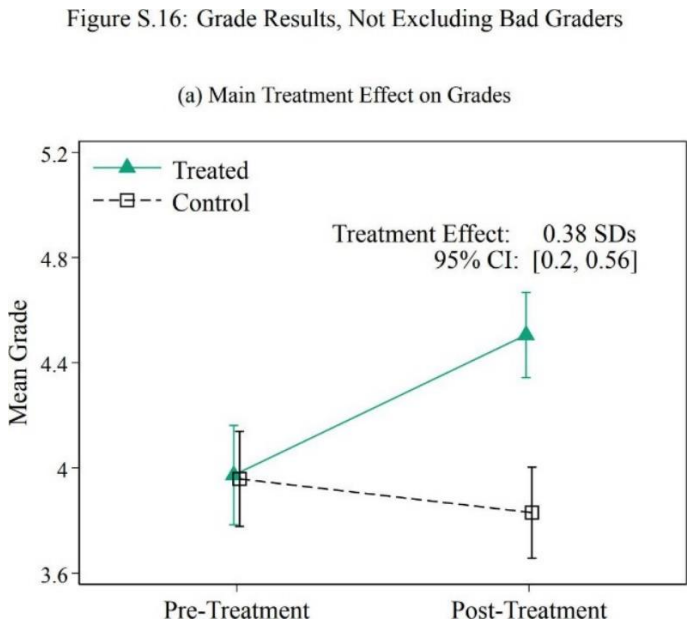
These findings present a more nuanced view of generative AI's role in the workplace. While tools like those studied by Brynjolfsson et al. (2023) clearly demonstrate the potential to enhance productivity, particularly among less experienced workers, it's essential for companies to consider the specific context in which AI is applied and to be mindful of the risks associated with overconfidence in AI technologies. By thoughtfully integrating AI tools into their business processes, companies, especially SMEs, can not only improve productivity but also enhance customer satisfaction and employee retention, all while navigating the potential pitfalls highlighted by Candelon et al. (2023).

4.2. Case Study: The Impact of Generative AI on Productivity, Job Satisfaction, and Equity in Task Performance

Even though the study by Noy and Zhang (2023) does not specifically address generative AI in automation within SMEs, nor does it focus exclusively on business environments, its findings are highly

relevant for understanding the potential of integrating LLMs into business processes, particularly in sales and marketing operations.

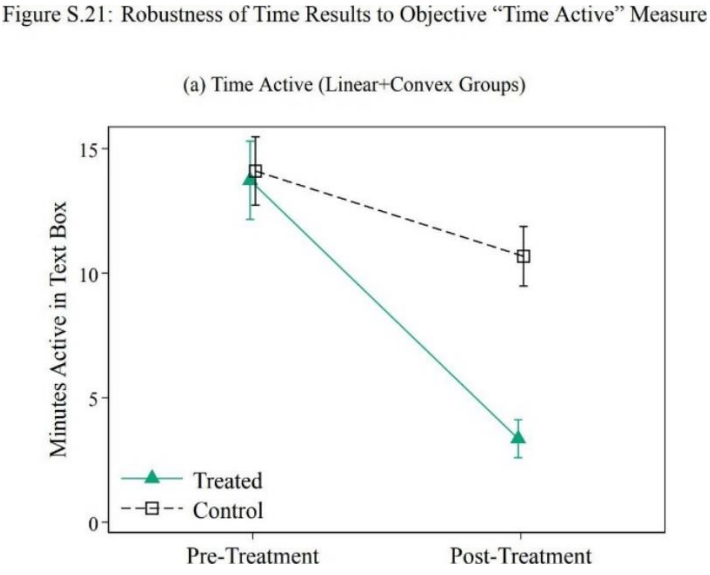
Figure 2: Writing Task Assessment with and without ChatGPT - Difference in Grades



Source: Noy, S., & Zhang, W. (2023). Experimental evidence on the productivity effects of generative artificial intelligence. *Science*, *381*(6645), 187-192. https://doi.org/10.1126/science.adh2586 (p. 102)

Noy and Zhang (2023) conducted an experiment to evaluate the impact of using ChatGPT on various writing tasks, which are highly analogous to many tasks performed in sales and marketing. The study demonstrated that integrating AI tools into business processes could significantly enhance productivity and operational efficiency. For example, the treatment group, which had access to ChatGPT, saw a substantial improvement in performance, with grades increasing by approximately 0.38 standard deviations compared to the control group (Figure 2). This improvement underscores how AI can elevate the quality of work outputs when integrated into daily tasks.

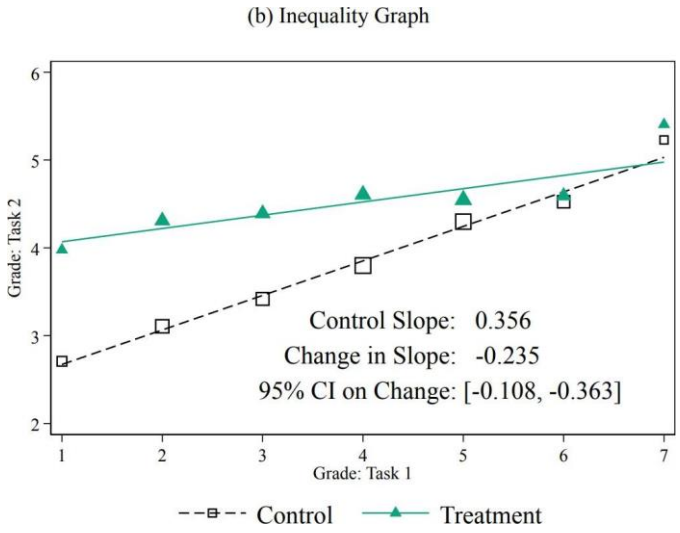
Figure 3: Writing Task Assessment with and without ChatGPT - Difference in "Time Active"



Source: Noy, S., & Zhang, W. (2023). Experimental evidence on the productivity effects of generative artificial intelligence. *Science*, *381*(6645), 187-192. https://doi.org/10.1126/science.adh2586 (p. 107)

Moreover, the study revealed that using ChatGPT allowed participants to complete tasks more quickly, with a significant reduction in time spent on tasks by approximately 10.8 minutes (Figure 3). In this context, the term 'post-treatment' refers to the group that had access to and used ChatGPT to complete the writing task, whereas the control group did not. This time-saving aspect is crucial for SMEs where resources are often limited, and efficiency gains can directly translate into increased capacity for handling sales operations and client interactions.

Figure 4: Writing Task Assessment with and without ChatGPT - Reduction in Inequality with AI



Source: Noy, S., & Zhang, W. (2023). Experimental evidence on the productivity effects of generative artificial intelligence. *Science*, *381*(6645), 187-192. https://doi.org/10.1126/science.adh2586 (p. 102)

Another key finding was the reduction in inequality among participants' performance. The use of ChatGPT reduced the variability in task outcomes, as demonstrated by a decrease in the slope of grade inequality in the treatment group (Figure 4). In this context, Task 1 represents the pre-treatment task, and Task 2 represents the post-treatment task. The figure illustrates how AI tools can help standardize the quality of output across different employees, ensuring a more consistent level of service or product quality, which is vital for maintaining brand reputation in sales and marketing efforts. For example, in customer support, generative AI could draft consistent, professional responses that reflect company standards. In client communications, it could streamline emails and reports, maintaining a uniform style that reinforces the brand's reputation through reliable interactions.

Beyond just improving performance metrics, the study also found that access to AI tools like ChatGPT can enhance job satisfaction and self-efficacy among employees. Participants who used ChatGPT reported higher levels of job satisfaction and self-efficacy, which are important predictors of long-term productivity and employee retention. For SMEs, fostering an environment where employees feel empowered and satisfied can lead to more motivated teams that are better equipped to achieve sales targets and innovate in their marketing strategies.

While these positive results are notable, it is crucial to recognize that they were recorded specifically in the context of writing tasks, which generally do not require a high degree of critical thinking or complex problem-solving. The study by Noy and Zhang (2023) underscores how generative AI, such as

ChatGPT, can significantly enhance productivity, job satisfaction, and equity in task performance when applied to these types of tasks. However, the effectiveness of AI tools can vary depending on the nature of the work.

As highlighted by Candelon et al. (2023), the suitability of generative AI for different types of tasks is critical to its successful application. While GPT-4, for instance, excels in creative tasks like ideation and content creation, it often struggles with tasks that require nuanced analysis and judgment, such as business problem-solving. In such cases, the technology can mislead users, leading to poorer outcomes. This highlights the importance of carefully matching AI tools to the specific tasks they are intended to assist with, ensuring that they enhance rather than hinder performance.

5. Addressing Risks and Ethical Considerations in AI-Driven Sales Operations

When integrating generative AI into marketing and sales processes, SMEs must navigate a complex landscape of risks and ethical considerations to ensure that the benefits of these technologies do not come at the expense of responsible business practices. One of the most significant risks associated with generative AI is the potential for "hallucinations," where AI models generate responses that appear accurate but are, in fact, false or misleading. This risk is particularly concerning in automated systems where human oversight may be limited, making it crucial for SMEs to adopt strategies that mitigate the occurrence of hallucinations.

Roychowdhury (2024) offers a detailed examination of how these hallucinations arise, pinpointing their roots in biased training data, ambiguous prompts, and inaccurate model parameters. These hallucinations are especially problematic when generative AI is used in domains that require precise numerical or tabular data, such as finance or business reporting. For SMEs, the implications of such errors can be severe, potentially leading to misguided business decisions, customer dissatisfaction, or even legal liabilities.

Figure 5: Roychowdhury's Framework to mitigate LLM hallucination in GenAI products

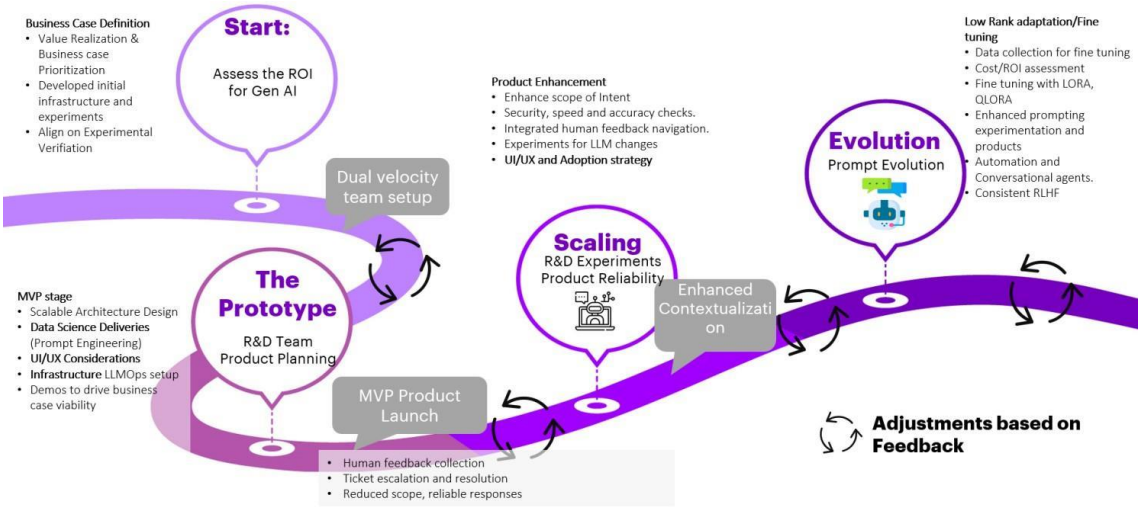


Figure 1: Stages in the journey of LLM based products for numerical and analytical data sources.

Source: Roychowdhury, S. (2024, March). Journey of Hallucination-minimized Generative AI Solutions for Financial Decision Makers. In *Proceedings of the 17th ACM International Conference on Web Search and Data Mining* (pp. 1180-1181)

To address these challenges, Roychowdhury (2024) proposes a comprehensive framework designed to minimize and control hallucinations. This framework is particularly relevant for SMEs, which may lack the resources for extensive human oversight. The framework is structured around three key stages: prototyping, scaling, and the evolution of AI models through iterative human feedback. In the prototyping stage, the focus is on building a minimum viable product (MVP) that includes modules specifically designed to monitor and mitigate hallucinations. This involves the development of novel components such as customized prompt generation and response quality scoring modules, which are crucial for ensuring that the AI outputs are reliable and contextually accurate.

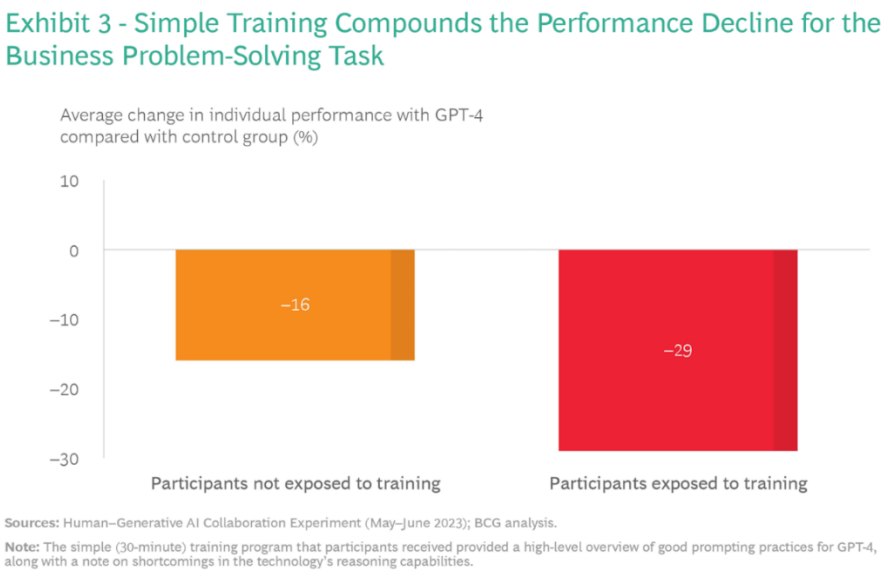
As the AI model progresses to the scaling stage, it is essential to benchmark its performance across a variety of user queries to ensure that it remains accurate, reliable, and repeatable under different conditions. Finally, in the evolution stage, the AI system undergoes continuous fine-tuning based on real-world interactions and reinforcement learning with human feedback (RLHF). This iterative process is vital for adapting the AI model to new data and scenarios, thereby reducing the risk of hallucinations over time.

The risk of hallucinations underscores the broader ethical and operational considerations that SMEs must address when implementing generative AI. For instance, overreliance on AI-generated content without adequate verification can lead to a loss of human judgment in critical decision-making processes, as highlighted by Townsend (2023) and further supported by the findings of Abousaber & Abdalla (2023). Additionally, the dependency of generative AI on high-quality data, as noted by Bi (2023), means that SMEs must invest in robust data management practices to prevent biased or erroneous outputs.

The impact of generative AI on the labor market, particularly among white-collar knowledge workers, is expected to be profound. Kanbach et al. (2023) highlight that GenAI's ability to automate routine cognitive tasks poses a significant challenge to roles traditionally held by white-collar employees, such as data entry clerks, paralegals, and customer service representatives. However, rather than solely focusing on the displacement of jobs, the authors argue that GenAI also offers opportunities for job transformation. Employees may increasingly shift from performing routine tasks to engaging in higher-value activities such as problem-solving, strategic planning, and innovation management. This shift could enhance their roles and allow them to contribute more effectively to their organizations, transforming potential threats into opportunities for growth and development.

Moreover, it is important to be aware of the potential unintended consequences of overconfidence in AI's capabilities. Candelon et al. (2023) found that participants who were trained on the limitations of GPT-4 performed worse in business problem-solving tasks than those who were not trained (Figure 6). This suggests that training might inadvertently foster overconfidence, leading users to overly rely on AI-generated outputs, which may not always be accurate. Such overconfidence can undermine the critical thinking needed for complex decision-making, reinforcing the need for careful consideration of when and how AI should be applied.

Figure 6: Simple Training Compounds the Performance Decline for Business Problem-Solving Task



Source: Candelon, F., Krayer, L., Rajendran, S., & Zuluaga Martínez, D. (2023, September 21). *How people can create—and destroy—value with generative AI*. Boston Consulting Group. https://www.bcg.com/publications/2023/how-people-create-and-destroy-value-withgen-ai

Furthermore, data privacy and security are critical concerns, especially when handling sensitive customer information. Ensuring compliance with data protection regulations is not just a legal necessity but also a crucial aspect of maintaining customer trust. As SMEs integrate generative AI into their sales processes, finding the right balance between AI automation and human expertise is crucial. While AI excels in automating repetitive tasks, human creativity and problem-solving are essential in key areas of the sales funnel. This is why, during our projects, we have exclusively focused on marketing and sales tasks that demand creativity and minor business problem-solving skills, ensuring that AI is used where it can truly add value without undermining critical human judgment.

Finally, SMEs face a crucial decision in how they choose to integrate GenAI into their operations. According to Kanbach et al. (2023), the strategic adoption of GenAI involves deciding whether to adopt off-the-shelf solutions, customize existing models, or develop proprietary AI systems. Each approach comes with its own set of challenges and risks. Off-the-shelf solutions might seem convenient, but they carry a risk of data leakage and create dependencies on third-party providers, which could compromise the security and integrity of business operations. On the other hand, customizing or developing proprietary models offers greater control and can be tailored to meet specific business needs, but these options require more significant resources and expertise. The choice of strategy will have significant implications for a company's ability to innovate, comply with data security and regulatory requirements, and maintain a competitive edge.

6. Synergizing Generative AI with Human Expertise: Optimizing Sales Processes for Small Businesses

In the quest to optimize sales processes through the integration of generative AI, SMEs face the challenge of striking a balance between AI-driven automation and human creativity and problem-

solving. This balance is critical to maximizing the effectiveness of sales operations while ensuring that the human touch, which is often key in sales, is not lost.

6.1. The Novelty-Usefulness Tradeoff in Generative AI

Mukherjee and Chang (2023) address this challenge by exploring the novelty-usefulness tradeoff inherent in generative AI systems. They argue that generative AI has the potential to either innovate or fall into the trap of producing content that, while novel, may be impractical or even inaccurate—commonly referred to as "hallucinations." On the other hand, if AI focuses too heavily on usefulness, it risks generating content that merely repeats established information without offering new insights.

For instance, in the context of sales, an AI that prioritizes novelty might suggest unconventional sales strategies that could confuse or mislead customers, while an AI that focuses solely on usefulness might simply replicate standard sales pitches, missing opportunities for creative engagement.

To navigate this tradeoff, Mukherjee and Chang (2023) propose a comprehensive framework that includes domain-specific analysis, data-driven customization, and user feedback loops. They emphasize the importance of developing custom evaluation metrics that assess both the novelty and practicality of AI outputs. For example, in the domain of marketing, this could involve creating AI-generated content that is both innovative in its approach and grounded in data that aligns with customer preferences and market trends. By iterating on AI models with human feedback, SMEs can fine-tune the balance between novelty and usefulness, ensuring that the AI-generated content not only captures attention but also drives actionable outcomes.

6.2. The Human-AI Collaboration in Sales Processes

Santhosh et al. (2023) further explore the dynamics of human-AI collaboration, emphasizing that the future of effective sales processes lies in this synergy. They argue that AI systems are well-suited for automating repetitive tasks, such as data entry, initial customer outreach, and pattern recognition in consumer behavior. However, they also stress that human skills in creativity, critical thinking, and ethical judgment are irreplaceable, particularly in more complex and nuanced aspects of sales.

The practical application of human-AI collaboration, particularly in creative tasks, requires careful consideration of how and when human intervention adds value. According to Candelon et al. (2023), human efforts to refine AI-generated outputs can often diminish the quality of the final product. This was particularly evident in creative tasks, where participants' attempts to deviate from GPT-4's initial output generally led to a decrease in quality. For instance, the study found that for every 10% increase in divergence from GPT-4's draft, participants' performance quality dropped by approximately 17 percentile points. This suggests that rather than attempting to enhance AI-generated outputs in areas where the technology already excels, human efforts should focus on tasks that push beyond the current capabilities of AI. Additionally, the study highlights the importance of training users to recognize when to trust AI outputs and when to apply their judgment, especially in tasks that require a deep understanding of context or complex problem-solving.

For instance, while an AI might be adept at analyzing customer data to suggest potential leads, it is the human sales professional who can interpret these insights and engage with the customer on an emotional and relational level, tailoring the pitch to meet the customer's unique needs and concerns. This collaboration can be seen in examples like hybrid job roles

where humans oversee AI systems, ensuring that the AI's outputs are applied effectively and ethically. An AI might flag potential upsell opportunities based on purchasing data, but a human sales representative can decide how best to approach these opportunities, taking into account the customer's history, preferences, and relationship with the brand.

6.3. Concrete Examples and Future Outlook

A practical example of this synergy is in the real estate industry, where AI can quickly sift through vast amounts of market data to identify trends and predict property values. However, the decision of how to present this information to potential buyers, or how to negotiate the final sale, requires human intuition and emotional intelligence—qualities that AI cannot replicate.

Similarly, in the e-commerce sector, AI can personalize product recommendations based on browsing history, but it is human creativity that designs engaging marketing campaigns that resonate with customers on a deeper level.

Looking forward, Santhosh et al. (2023) suggest that as AI continues to evolve, the roles of humans in the workforce will also need to adapt. This may involve the creation of new job roles that blend AI management with human decision-making, such as AI ethicists or human-AI integration specialists. These roles will be crucial in ensuring that AI tools are used effectively and responsibly, maintaining a balance that leverages AI's strengths while safeguarding the essential human elements of creativity, empathy, and ethical reasoning.

7. Conclusion

The literature highlights how SMEs can strategically integrate GenAI to enhance their operations. GenAI offers significant opportunities to improve efficiency, especially in content creation, marketing, and sales (Kanbach et al., 2023; Bi, 2023; Townsend, 2023). For companies like GMCOLAB, leveraging GenAI can lead to innovative business models that provide personalized, scalable solutions, keeping them competitive in a rapidly evolving market. This shift isn't just about automation; it's about transforming business operations to offer greater customer value.

GenAI also provides practical benefits for SMEs. It can generate personalized marketing content that improves customer engagement and brand consistency (Kanbach et al., 2023; Townsend, 2023). AI-driven chatbots and virtual assistants can automate routine customer support, freeing human resources for more complex issues and enhancing customer satisfaction (Townsend, 2023; Abousaber & Abdalla, 2023). In sales, GenAI's ability to analyze consumer behavior and optimize strategies allows for more targeted and efficient efforts (Bi, 2023). Additionally, automating repetitive tasks like data entry and email management reduces labor costs and boosts operational efficiency, enabling SMEs to focus on higher-value activities (Townsend, 2023; Abousaber & Abdalla, 2023).

The literature also emphasizes balancing AI with human creativity and decision-making. While GenAI excels at handling repetitive, data-driven tasks, it shouldn't replace the human element. Instead, it should complement human efforts, especially in areas requiring creativity, emotional intelligence, and complex problem-solving (Santhosh et al., 2023; Mukherjee & Chang, 2023). SMEs are advised to develop feedback loops that refine AI outputs with human input, ensuring that the content produced is both innovative and practical (Mukherjee & Chang, 2023; Santhosh et al., 2023). This approach

allows businesses to maximize AI benefits while preserving the essential human touch crucial for successful customer interactions and decision-making.

This literature review highlights the growing importance and potential of GenAI in enhancing sales operations for SMEs. While the benefits of GenAI, particularly in content creation, marketing, and sales, are well-discussed, there is a noticeable gap in the practical application of GenAI-powered automations specifically within the SME context. Most existing studies focus on larger enterprises with extensive resources, where the integration of AI has been shown to yield clear benefits. However, concrete examples demonstrating the value-added potential of GenAI-driven automation, particularly in sales and marketing for resource-constrained SMEs, are scarce.

The literature suggests that GenAI could bridge the gap between small businesses and large multinational corporations, enabling SMEs to compete more effectively by leveraging advanced technologies. Yet, in practice, it is predominantly large companies that reap the benefits of GenAI, as they possess the resources to train custom models and implement sophisticated, highly automated systems. This situation raises critical questions about whether GenAI truly democratizes opportunities for SMEs or if it inadvertently widens the resource gap.

Furthermore, while GenAI is undeniably a groundbreaking technology with unparalleled capabilities, it also introduces significant risks. Issues such as the generalization of content, potential overreliance leading to diminished creativity and critical thinking, and the possibility of AI-generated content misaligning with a company's core vision and mission are of particular concern. These risks are amplified in SMEs, where the margin for error is smaller, and the impact of missteps can be more profound.

For SMEs daring to venture into AI-driven automation, several pressing questions arise: Should they develop these solutions internally or purchase third-party systems? Which business activities should they prioritize for automation? How much AI expertise is required to be fully aware of the potential dangers GenAI might pose once integrated into business processes? The literature provides little guidance on these practical considerations, leaving SMEs with significant uncertainty.

These gaps in the literature and practical challenges prompt the following research question:

How can generative AI-powered automations enhance small business sales operations?

This question aims to explore not only the potential benefits of GenAI in an SME setting but also the practical steps, management considerations, and risks involved in implementing such technologies. By addressing this question, this thesis will present well-documented, practical examples where GenAI was successfully implemented in sales automation within an SME with limited resources by an intern, starting from the exploration of viable tools to the development of practical solutions, including MVPs and a finished product.

Part 3: Contextualization of Projects and Methodological Approach

Due to the diverse nature of the projects undertaken during the internship at GMCOLAB and the agile approach employed throughout, a unified methodology was not feasible. Each project evolved with its own distinct challenges and required tailored approaches to address them effectively. Consequently, the methodology is not presented as a single, overarching section in this master's thesis. Instead, it is integrated into the discussion of each individual project, allowing for a more nuanced and project-specific explanation of the methodologies employed. This approach ensures that the unique aspects and strategies of each project are adequately captured and contextualized within their respective sections. Additionally, consistent with the agile approach, frequent communication was maintained throughout all phases of the project developments, ensuring continuous assessment of their progress.

Contextualization of the Company's Strategy

GMCOLAB initially focused on providing high-quality, competitively priced services on platforms like Upwork by hiring employees in lower-wage countries and selling services to higher-income markets. With the rise of AI technologies like ChatGPT in 2022, the company shifted its focus to AI-related projects, leveraging its expertise in API[2] integration. As competition on Upwork increased, GMCOLAB launched the Novelevate project to develop a tool for creating personalized children's books using generative AI. However, due to challenges and low market interest, the project was abandoned, leading the company to refocus efforts on sustainability.

This shift occurred around the same time Gabriel recognized an opportunity in the relatively uncompetitive Flemish market, which possesses higher purchasing power and a demand for AI implementation. As a result, GMCOLAB redirected its efforts towards the Flemish market, utilizing the expertise gained in generative AI integration and a deep understanding in the field.

Projects Selection and Personal Role

I commenced my internship shortly after the cessation of the Novelevate project. With my background in development, particularly in executing IT projects utilizing artificial intelligence since the end of 2022, such as the application of ChatGPT, I was able, alongside Killian, to actively contribute to the creation of presentations and a LinkedIn automation project. These two initiatives are crucial for enabling the company to collaborate with firms for consulting sessions or project sales.

In the third phase of my internship, after having made significant contributions and in a context where Gabriel was relatively occupied, Killian and I were approached by a contact in our network, Caroline from WashConnect, to undertake an automation project. We decided to seize this opportunity, under the supervision of GMCOLAB, to carry out the project from start to finish, which we successfully accomplished.

In the next section we will develop in detail the different projects and their results.

[2] Application Programming Interface

Part 4: First Project: Lead Generation and Customer Segmentation on LinkedIn - A GenAI Powered Automation

1. Objectives

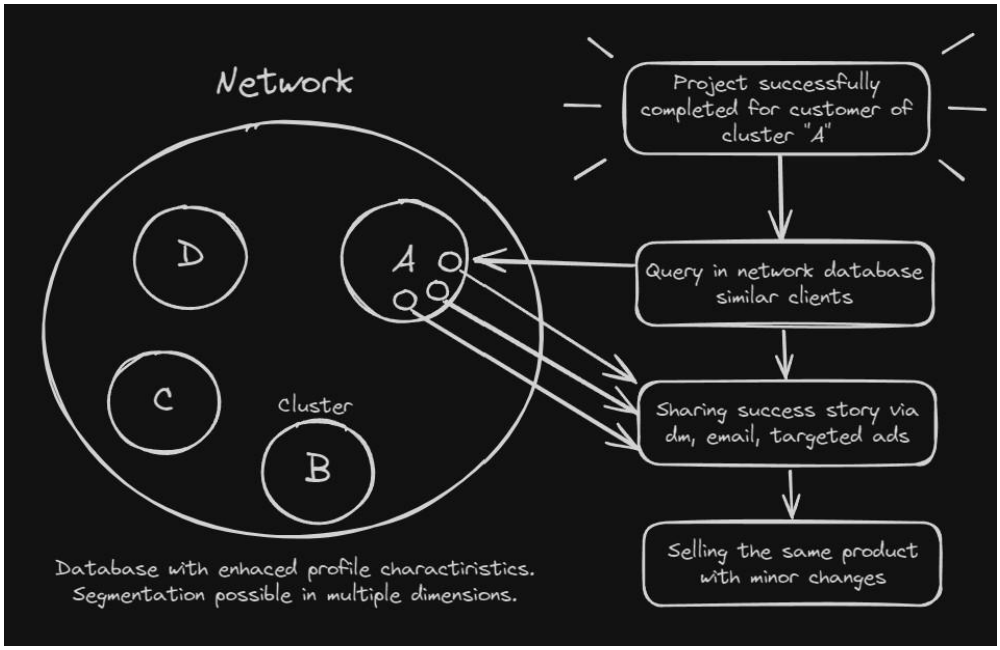
The objective of this project is to enhance GMCOLAB's lead generation and customer segmentation capabilities on LinkedIn by implementing a generative AI-powered automation workflow. This initiative aims to streamline client identification, engagement, and marketing strategies, ultimately improving GMCOLAB's overall sales operations.

Gabriel placed significant importance on leveraging LinkedIn for marketing, adapting business strategies, and identifying opportunities. Over the past few years, even before integrating generative AI into his business, Gabriel has focused on amplifying his LinkedIn network. He believes the platform offers substantial growth potential for SMEs, especially when the CEO or founder plays a central role in communication. LinkedIn effectively bridges the communication gap between various stakeholders, including clients, collaborators, freelancers, suppliers, and event organizers.

The platform's features, such as direct messaging, posts, and reactions, have proven to boost customer conversion by accelerating interactions. LinkedIn allows Gabriel to immediately showcase GMCOLAB’s value proposition, making it an ideal tool for customer acquisition and relationship building. Given these advantages, Gabriel is convinced that leveraging LinkedIn’s data and features is the optimal strategy for growing GMCOLAB’s client base and strengthening business relationships.

Since the beginning of the internship, Gabriel has made his marketing strategy clear: to achieve customer loyalty and recurring revenue, one must nurture their network. This nurturing technique involves clear steps tailored to a specific customer's journey. The goal is to incrementally interact with the customer, starting with LinkedIn posts to elicit interactions, followed by connection requests, and eventually customized direct messages. These messages aim to find synergies between GMCOLAB's goals, values, and activities, and the profile information of potential clients. LinkedIn, therefore, serves as an excellent platform for initiating and materializing client relationships.

Figure 7: Benefit of Clustering Profiles for Efficient Ad Targeting and Communication



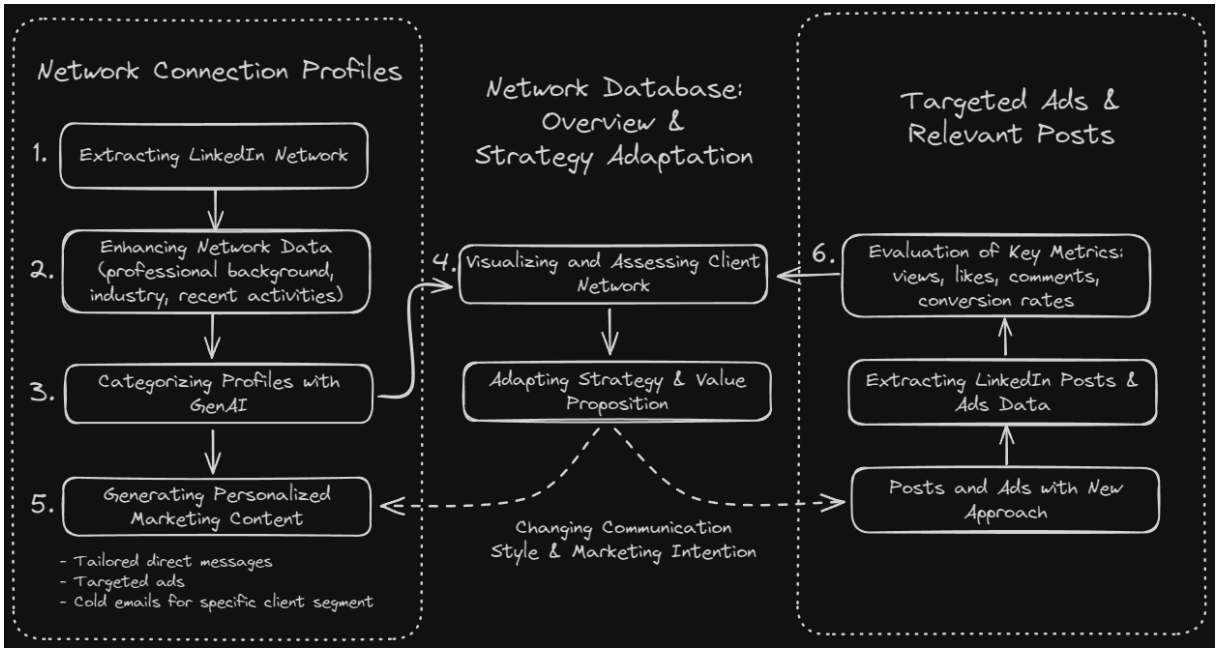
Querying Gabriel's LinkedIn network offers significant potential for productivity gains. By clustering his connections based on various attributes, GMCOLAB can more effectively explore new opportunities, replicate successful client interactions, and design targeted advertising campaigns. For instance, after successfully completing a customer service emailing automation project for a clothing e-shop dealing with returns and reimbursements, this success story can be leveraged through direct messaging or targeted ads on LinkedIn. Using the dynamically enhanced data from the LinkedIn network, attributes of similar connections—such as other clothing e-shops—can be identified and targeted with personalized marketing content. This includes sending cold emails[3] or generating custom messages with generative AI, tailored specifically to their business needs. By systematically targeting these similar prospects, GMCOLAB can significantly increase its efficiency.

Gabriel's approach to leveraging LinkedIn for lead generation and customer segmentation involved specific constraints and a clear set of recommendations to ensure the project aligned with GMCOLAB's strategic goals. The primary constraint was the need to maintain the quality and authenticity of interactions, which Gabriel identified as crucial for building and sustaining client relationships. He emphasized that any automation should not compromise the genuine engagement that GMCOLAB values.

To address this, Gabriel recommended starting with the development of a structured lead generation strategy that begins with non-intrusive, value-driven content. For example, he suggested creating and distributing "lead magnets" such as simple integrations of OpenAI with Google Sheets. These lead magnets could serve as practical tools or guides relevant to different target audiences. One example Gabriel provided was a Google Sheet template designed for e-commerce businesses, which could help them generate product descriptions using AI. Another example was a guide on how companies can prepare their teams to effectively use AI tools like ChatGPT.

[3] "Unsolicited emails used as an email marketing technique to introduce a brand to a recipient who has no prior relationship" (Popupsmart, n.d.).

Figure 8: Lead Generation and Customer Segmentation Strategy on LinkedIn



Based on the aforementioned objectives, Gabriel outlined a specific workflow for this project:

1. **Extracting LinkedIn Network:** The first step involves extracting Gabriel's LinkedIn connections using appropriate tools to build a comprehensive dataset of his professional network.

2. **Enhancing the Network Data:** Once the network is extracted, the data will be enriched using various scraping tools. This process aims to gather additional relevant information about each connection, such as professional background, industry, and recent activities.

3. **Categorizing Profiles with GenAI:** The enhanced data will then be used to categorize the LinkedIn connections into distinct segments. This categorization will be driven by a generative AI integration, allowing for the identification of key attributes and patterns within the network. For example, profiles can be segmented into categories like e-commerce businesses, sales professionals, or tech industry leaders.

4. **Visualizing the Network:** To provide Gabriel with a practical overview of his network, the categorized data will be expanding GMCOLAB's reach while keeping interactions personalized.

5. **Classifying and Clustering Connections:** Analyze and segment existing LinkedIn connections to gain insights and improve communication strategies.

6. **Optimizing Connection Requests:** Address LinkedIn's limit of 200 connection requests per week by optimizing the selection process to ensure high acceptance rates.

7. **Enhancing Message Quality with AI:** Use AI to craft high-quality, relevant automated messages to improve engagement and understand network dynamics better.

Given the broad requirements, Gabriel emphasized that it was not necessary for a single automation to meet all objectives. As mentioned before, the focus was on exploring solutions that could address specific needs, with a priority on those that could quickly deliver an MVP or proof of concept. This

approach allowed the company to gather valuable insights, leaving the door open for a developer to further refine and implement the solution based on the initial findings.

4. First sub-Project: LinkedIn Lead Generation Automation

This project was the first phase of our work on LinkedIn, focusing on expanding GMCOLAB's reach by identifying and engaging potential clients outside of Gabriel's immediate network. This included automating the process of discovering and connecting with prospects such as 2nd-degree connections, participants in LinkedIn event groups, and users interacting with posts and ads. The primary goal was to build a scalable system that could efficiently generate new leads and facilitate initial contact with these potential clients.

4.1. Exploration of Solutions

An exploratory analysis of various tools and solutions was conducted. Gabriel was already familiar with some tools for extracting profile data and automating messages on LinkedIn. However, his workflow involved many manual tasks, had limitations in the quality and amount of data extracted, and ended with data in a Google spreadsheet without further enhancements such as GenAI message generation, clustering, or dynamic database management.

The initial tools considered included:

- **PhantomBuster:** A web scraper for extracting data from LinkedIn profiles, posts, and events.
- **Dripify:** A tool for automating connection requests and messaging on LinkedIn.

Despite their utility, these tools had limitations, such as the need for multiple software integrations and potential risks of violating LinkedIn's guidelines, leading to account suspension.

The goal was to delve deeper into the capabilities of these tools, find new ones, and assess their connectivity and features to address the previously mentioned requirements. Specifically, the objectives were to:

1. **Reduce Human Intervention:** Connect as many steps as possible to minimize manual tasks.
2. **Explore Features:** Dive deeper into each tool's features to discover new benefits and enhance the project.
3. **Potential for Product Development:** Keep in mind that this lead generation and network segmentation system could be developed into a software product with the right client.

4.2. Choosing the Right Approach

After a comparative analysis, Linked Helper was selected as the primary tool for the following reasons:

1. **Cost-Effectiveness:** Linked Helper met most project requirements and was significantly cheaper than PhantomBuster. While PhantomBuster would cost at least $159 per month to extract Gabriel's 3000+ connections due to its execution time limits, Linked Helper could handle this and more for just $15 per month.
2. **Comprehensive Data Extraction:** Linked Helper offered several additional data points over PhantomBuster that significantly enhanced clustering and ad targeting efforts. These data

points included address, company description, company location, skills, number of mutual connections, number of followers, detailed last messages (received and sent), date of connection, list of spoken languages (ranked by proficiency), and educational background, including attended universities and degrees. These data points provided a more comprehensive profile, crucial for precise audience segmentation and targeted marketing strategies.

3. **Reducing Banning Probability:** During the research phase, it was discovered that Linked Helper likely uses a library like Selenium for Python or Puppeteer for Node.js to interact with JavaScript-powered websites like LinkedIn. This conclusion was reached after gathering information, observing how Linked Helper interacted with LinkedIn, and conducting tests with a similar script in an ancillary project. The ability to set cooldown times between scraping profiles reduces the risk of getting banned. Additionally, this library enables human-like interactions with JavaScript-powered HTML elements, such as buttons and text fields, by writing the names of searched persons in the search bar letter by letter instead of going directly to the profile URL. This behavior mimics natural user activity and minimizes detection risk.

4. **Integration Capabilities:** Linked Helper could seamlessly send profile data to third-party services via webhooks [4](e.g., Zapier, Make, CRMs), streamlining data management. In contrast, PhantomBuster required coding a script to pass the extracted profile data to other services, adding complexity and potential errors.

However, there was a specific feature that Linked Helper lacked—the ability to receive data, particularly for sending AI-generated custom messages to profiles. To address this, PhantomBuster was used in synergy with Linked Helper, as it allowed for the automated sending of these custom messages. Adding PhantomBuster in this capacity is not as expensive as the aforementioned cost to extract Gabriel's 3000+ connections ($159) since PhantomBuster's pricing model is based on execution time. Specifically, the profile scraping processes are time-intensive, making PhantomBuster a poor choice for that task. Yet, automatically sending AI-generated custom messages to the profiles takes far less execution time, making it a financially viable tool. This is why PhantomBuster was still used in the workflow, effectively complementing Linked Helper's capabilities.

These factors made Linked Helper the main element of GMCOLAB's lead generation and customer segmentation project, ensuring efficient data extraction, reduced costs, compliance with LinkedIn's guidelines, and easy integration with other tools and services. While not the sole tool used, Linked Helper served as the core component, with PhantomBuster effectively complementing its functionality where needed.

[4] "A webhook is an HTTP request, triggered by an event in a source system and sent to a destination system, often with a payload of data. Webhooks are automated, in other words they are automatically sent out when their event is fired in the source system" (Hookdeck, n.d.).

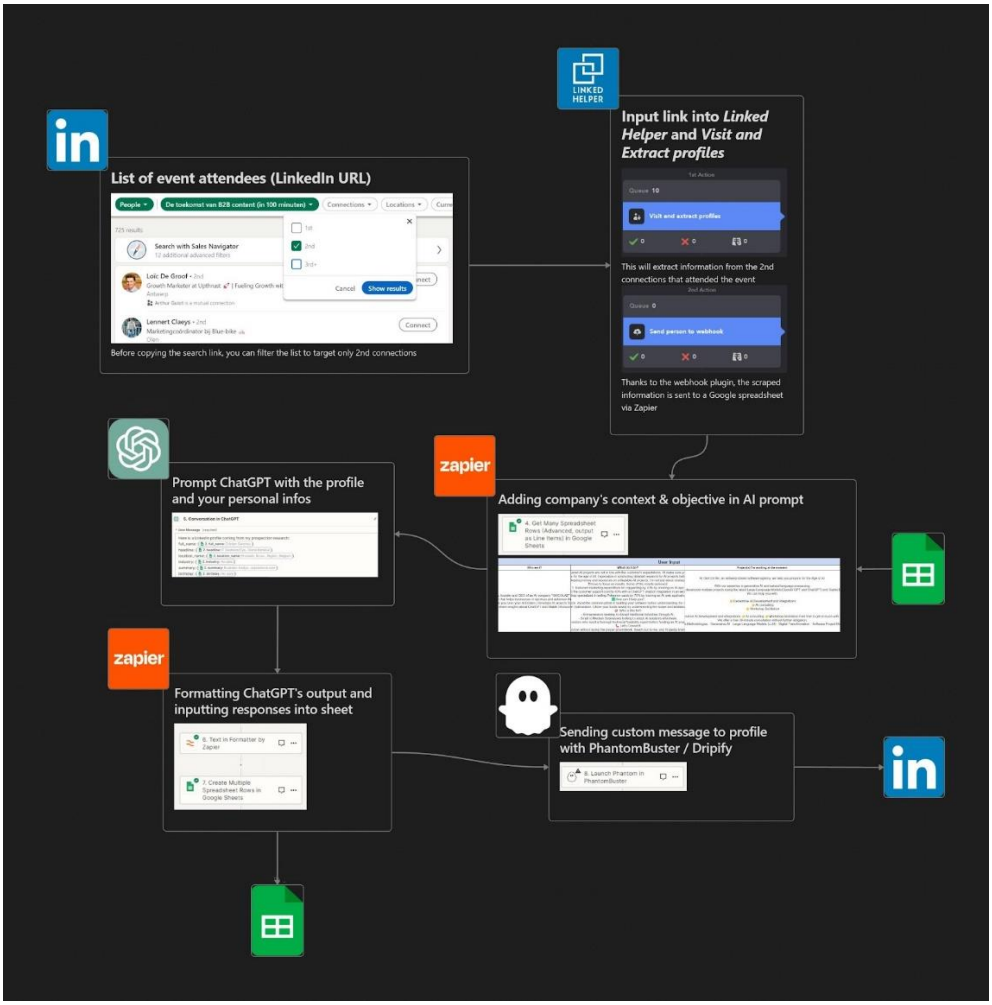
4.3. First Proof of Concept: Sending GenAI Custom Connection Request Messages

The goal was to build an initial proof of concept that demonstrated the potential for automation in sending customized connection request messages to profiles attending LinkedIn events.

Gabriel assigned the task of evaluating and connecting various software tools to create a functional MVP that could send connection request messages. The process involved assessing the financial viability, time efficiency, and qualitative value of these tools to increase the chances of accepted connection requests. This task was undertaken, from conducting the comparative analysis of software options to integrating them into a cohesive workflow that met the project's objectives. The primary aim of this first run was to evaluate the effectiveness of the end output of this automation—specifically, the relevance and quality of the customized messages sent to potential customers on LinkedIn.

The evaluation focused on how well these messages aligned with GMCOLAB's marketing objectives and how effectively they utilized the curated profile data from LinkedIn connections. By analyzing these factors, the project aimed to determine how successful the automation was in generating meaningful and relevant engagement with potential clients through LinkedIn lead generation and customer segmentation.

Figure 9: Workflow of first working automation involving multiple software tools



One effective way of finding potential clients was through LinkedIn event groups, as these events attract attendees with specific needs and intentions. Gabriel actively participated in these groups, which were particularly valuable for GMCOLAB because they allowed for easy identification of potential customers within specific sectors. This approach provided opportunities not only to tailor marketing strategies to these segments but also to generate ideas for product development based on the attendees' specific needs. Extracting attendees from specific events, in addition to profiles already within Gabriel's network, allowed GMCOLAB to expand its reach and engage with a broader, more targeted audience. The key steps and tools used in this process are outlined below:

1. **Automation Workflow:**
    - **Linked Helper:**
        - The process began by taking the URL of the LinkedIn event attendees list and inputting it into Linked Helper, enabling the extraction and analysis of this highly relevant and targeted pool of potential clients.
        - Linked Helper scraped the profile data, implementing cooldown periods between each profile to reduce the risk of account banning.
        - This tool could send the scraped information via a webhook to other software tools.
    - **Zapier Integration:**
        - Zapier received the profile information in JSON format.
        - Alongside this data, contextual information provided in Google Sheets was included to guide the LLM in generating a custom connection request message as explained in point 2 below.
        - Inputs from Google Sheets included Gabriel's background, the company's description, the goal of the connection request, and current projects GMCOLAB was working on.
2. **Generating Custom Messages:**
    - **OpenAI API:**
        - The LLM used inputs such as profile information (name, bio, company, language, job title, degree, sector) and contextual data from Google Sheets to create a relevant and personalized message.
        - The prompt provided to the LLM included detailed instructions to ensure the output was a connection request message that linked Gabriel's profile and GMCOLAB's projects to the targeted attendee's profile information.
3. **Automation Execution:**
    - **Google Sheets:** The response generated by the LLM was sent back to the Google spreadsheet for tracking and further refinement of the prompts and inputs.
    - **PhantomBuster:** The generated connection request message was then sent to PhantomBuster, which automated the sending of connection requests to specific profiles.

The initial workflow demonstrated that complete automation was feasible, viable, and valuable, as it allowed multiple connection requests to be sent with a higher chance of acceptance.

The MVP was successful but required multiple manual interventions, such as copying and pasting the LinkedIn event URL into the Linked Helper campaign. Additionally, using Zapier incurred significant costs due to the high number of profiles processed, potentially reaching hundreds of euros. Considering this, improvements were needed to reduce costs and manual tasks, ensuring the automation was viable and useful in the long run. Further iterations and versions were planned to optimize and streamline the process.

4.4. Improving the automation: Replacing Zapier with Webhooks for Sheets

Following the initial proof of concept, several enhancements were made to improve the efficiency, cost-effectiveness, and functionality of the LinkedIn lead generation automation. These improvements aimed to reduce manual interventions, optimize workflows, and enhance the overall quality of data extraction and message generation.

After exploring alternatives to Zapier, a Google Sheets plugin called "Webhooks for Sheets" was identified as a preferable tool. This plugin allows for GET and POST requests via a webhook, enabling seamless data transfer between Linked Helper and Google Sheets.

- **Cost Reduction:** Eliminating Zapier significantly reduced costs, as Zapier charges based on the number of automation tasks, which could quickly escalate to hundreds of euros given the high volume of profiles processed. While Zapier is typically valuable for handling complex workflows, in this case, its utility for processing webhooks was not particularly advantageous, as it charges 1 credit per profile processed, making it an inefficient choice for this specific task.
- **Increased Efficiency:** The dependency on an additional platform was removed, streamlining the workflow and making the automation more straightforward and robust.

After identifying this plugin, it completely replaced Zapier for the transfer of profile data to Google Sheets, and we therefore implemented it definitively into the main automation workflow.

4.5. Enhancing Profile Information with Crucial Data Points: Developing a Custom Python Script to Extract Company Size and Company Location

During the development of the LinkedIn lead generation and customer segmentation automation workflow, it became evident that certain key data points—specifically, company size and location—were not retrievable through Linked Helper. These data points were particularly important for GMCOLAB, as Gabriel's primary target market consists of SMEs, specifically those with fewer than 20 employees. This focus is because smaller companies are more likely to need external expertise in generative AI and automation, as they typically lack the internal resources to handle these tasks. Larger companies, on the other hand, often have dedicated personnel for such roles, making them fewer ideal targets for GMCOLAB's offerings.

Given the importance of accurately targeting SMEs, it was essential to find a solution that could extract these crucial data points. After exploring various options, the decision was made to develop a custom

Python script[5] that could effectively scrape LinkedIn profiles for the needed information. The script was built in a Jupyter Notebook [6]environment, utilizing Selenium for browser automation. This decision was informed by an analysis of how Linked Helper likely functions; it was deduced that Linked Helper, if developed in Python, would use Selenium due to its capability to interact with web elements—something other scraping libraries struggle to achieve. A detailed run-down of the custom Python script can be found in appendix C.

Custom Script Development

A comprehensive script was created to extract detailed profile data from LinkedIn events, search links, post links, and previously scraped data. This script not only captured basic information like first name, last name, and profile link but also crucial data points such as company size and location, which were not accessible through Linked Helper. This enhancement allowed for more precise audience segmentation, directly aligning with GMCOLAB's strategic focus on SMEs.

Detailed Data Extraction

The script extracted a wide range of data points, including:

- **Basic Information:** First Name, Last Name, Full Name, Profile Link, Degree of Connection, Bio, Location, Reaction Type (if from a post), Country, Job Title, Employment Duration, Company Name, **Company Size**, **Company Location**, Company Link, Education Degree, University Attended.
- **Contact Details:** Phone Number, Email Address, Twitter Handle, Birthday.

Benefits of the Custom Script

1. **Data Privacy:** Unlike Linked Helper, the custom script did not require passing sensitive information such as the LinkedIn password to a third-party tool. This reduced the risk of exposing personal and company data.
2. **Cost Efficiency:** Although Linked Helper is relatively affordable, the custom script eliminates the need for any recurring costs associated with using the tool, making it a cost-effective solution in the long run.
3. **Flexibility and Modularity:** The script's development in a Jupyter Notebook environment provided significant flexibility. The code is modular and can be easily adapted or extended to include additional scraping functionalities as needed. This modularity makes it possible to adjust the script to scrape new data points or adapt to changes in the LinkedIn interface with minimal effort.

Drawbacks of the Custom Script

1. **User-Friendliness:** The custom script lacks a graphical user interface (GUI), making it less user-friendly compared to Linked Helper. Running and modifying the script requires some programming knowledge, which could be a barrier for non-technical users.

[5] Custom Python script: https://github.com/mrfidibus7/linkedinprofilescraper/tree/main

[6] "An open-source web application that you can use to create and share documents that contain live code, equations, visualizations, and text" (Real Python, n.d.).

2. **Maintenance Requirements:** The script demands ongoing maintenance, particularly in response to updates in LinkedIn's website structure or policies. LinkedIn frequently updates its interface and security measures, which could render the script obsolete or require significant redevelopment to restore functionality.

3. **Development Overhead:** Unlike using a pre-built tool like Linked Helper, which requires minimal setup and maintenance, the custom script necessitates development time and expertise. This includes regular updates to the codebase to accommodate any changes in the packages used or adjustments in LinkedIn's HTML structure.

The decision to develop a custom script was driven by the necessity to access specific data points crucial for GMCOLAB's business strategy. While this approach offered greater control, cost savings, and tailored functionality, it also introduced challenges related to user accessibility and ongoing maintenance. Despite these challenges, the script proved essential for achieving the desired level of precision in GMCOLAB's lead generation and customer segmentation efforts.

Automation Workflow and Data Management

The script was designed to mimic human behavior, avoiding detection by LinkedIn and incorporating several features to enhance usability and functionality.

1. **Browser Automation with Selenium:** The script used ChromeDriver to control the browser, logging in with LinkedIn credentials and performing searches and profile scraping in a human-like manner.

2. **Data Integration:** Extracted data was sent to Google Sheets via webhooks, enabling easy data management and further processing.

3. **Shallow and Deep Scraping:** The script allowed for both shallow scraping (basic information) and deep scraping (detailed data), providing flexibility based on the required level of detail.

4. **Pause and Resume Feature:** The ability to pause and resume the scraping process prevented data loss and allowed for interruptions without restarting from scratch.

5. **Error Handling:** The script included mechanisms to handle errors and adapt to changes in LinkedIn's HTML structure, ensuring reliability and continuity.

Workflow Execution and Optimization

The improved workflow involved several key steps:

1. **Event URL Input:** The LinkedIn event URL was input into Linked Helper, which scraped profile data with cooldown periods to reduce the risk of bans.

2. **Data Transfer via Webhooks:** Profile data was sent to Google Sheets using the "Webhooks for Sheets" plugin.

3. **Custom Message Generation:** Using the data from Google Sheets, contextual information, and a predefined prompt, an LLM generated personalized connection request messages.

4. **Automated Messaging:** The generated messages were tracked in Google Sheets and sent out using PhantomBuster, automating the connection requests to specific profiles.

Results and Possible Future Improvements

The enhanced automation workflow, developed to address a specific subtask within the broader lead generation and customer segmentation project, demonstrated significant improvements over the initial proof of concept. The custom script provided more detailed and relevant data for better targeting and message generation. This script was specifically designed to extract data points that were critical for GMCOLAB's objectives but were not accessible through tools like Linked Helper or PhantomBuster.

It is important to clarify that this custom script was developed to fulfill a specific requirement: obtaining detailed company information such as size and location, which were not available through existing tools. The script complements, rather than replaces, the functionalities of Linked Helper and PhantomBuster. These tools remain integral parts of the overall workflow, with Linked Helper managing large-scale profile scraping and PhantomBuster handling the automation of AI-generated messaging.

The script was only temporarily used and was particularly useful for extracting company size and location, actively serving its purpose during the internship. However, after an update, both Linked Helper and PhantomBuster added the capability to scrape these data points, making the custom script somewhat obsolete. Nevertheless, the script remains functional and could be utilized in situations where the aforementioned tools become unreliable or fail to capture specific data points. Future iterations may still consider optimizing this script for specific use cases or as a backup solution.

The development of the script took a considerable amount of time relative to the utility it provided and the risk of it becoming obsolete. However, it was an enriching experience, offering valuable lessons in dynamically web scraping data using the Python programming language and the Selenium library.

Exploring Advanced Applications: Integrating Machine Learning and Deep Learning

Given the script’s modularity, there is also potential to integrate it into machine learning or deep learning pipelines for more advanced applications. For example:

- Predictive Analytics: The script could be adapted to use attributes like job title, company, and education to predict career progression trends or industry shifts, offering valuable insights for strategic decision-making.
- Recommendation Systems: By leveraging the data collected, it would be possible to develop recommendation systems that suggest articles, connections, or job opportunities based on user profiles and behavior, enhancing the personalization of marketing efforts.
- Network Analysis: Employing algorithms to analyze social networks, the script could help understand relationship dynamics within specific industries or regions, providing deeper insights into target markets and potential areas for growth.

These potential future developments highlight the script's versatility and the broader opportunities for GMCOLAB to leverage advanced analytics and machine learning techniques in its operations.

Even though in the upcoming section, "LinkedIn Network Connection Segmentation," generative AI has been used to enhance characteristics for each profile and categorize profiles into segments, no classical classification machine learning algorithms were employed. As Gabriel's network continues to

grow—currently at 3,500 connections—these machine learning options could become increasingly relevant. Exploring these avenues, either by Gabriel and his team or by engaging a machine learning/data science engineer, could further enhance GMCOLAB's capabilities in the future.

4.6. Assessment on the improved lead generation automation

The LinkedIn lead generation automation project provided a broad scope, allowing for creative exploration during the research and implementation phases. The initial phase involved identifying and evaluating various tools to automate LinkedIn lead generation. This phase was particularly enriching, as the open-ended nature of the project allowed for significant creativity. However, it also revealed the challenges of extensive research, where it is easy to lose track of time. Gabriel emphasized the importance of balancing thorough research with practical decision-making. He stressed that finding a viable solution within a reasonable timeframe was crucial to prevent the project from stalling. In the dynamic environment of GMCOLAB, an SME working with generative AI in business and marketing, the ability to identify actionable solutions quickly is key to moving projects into the development phase and ensuring they remain on schedule.

During the implementation phase, the project transitioned from research to the technical challenge of developing a functional MVP that met GMCOLAB's needs. This phase required leveraging IT knowledge to assess which steps would work and which needed alternatives. Understanding Gabriel's specific objectives for the MVP was essential in guiding these decisions and accelerating the development process. It took multiple iterations and problem-solving sessions to arrive at a viable automation solution. The outcome demonstrated that LinkedIn lead generation automation could be a valuable tool in the marketing strategy of SMEs or startups, particularly those with limited resources for marketing and sales.

Adapting to the dynamic project environment was crucial for the success of the LinkedIn lead generation automation. Regular discussions with Gabriel and Killian played a significant role in continuously refining the approach. Gabriel emphasized several times that fully automating every step was not the priority, as the project was aimed at producing an MVP rather than a finished product. The focus was on creating a workflow that could be tested for its effectiveness in improving productivity, output quality, and lead generation. This meant that some manual steps were intentionally retained to expedite development and allow for quicker assessment. For instance, one manual step involved transferring the LinkedIn profiles sheet (CSV file) to PhantomBuster for sending custom messages. Although the original plan was to integrate this step into the Zapier workflow, it proved challenging to achieve full automation at that stage. This issue was later resolved in the "LinkedIn Network Connection Segmentation" project by switching to Make that offered better options for incorporating PhantomBuster.

Daily communication with Gabriel and Killian was essential for aligning project goals and ensuring the project stayed on track. Our routine morning meetings at 9 a.m. provided an opportunity to discuss daily objectives and address any challenges that arose. While Killian focused on content creation for GMCOLAB's seminars and webinars, I was responsible for the LinkedIn lead generation automation. Nonetheless, there were instances where our roles overlapped—such as when I assisted Killian with seminar content, and he provided feedback on specific automation challenges I faced. Gabriel, as the internship supervisor, frequently provided insights into how this automation fit into his overall strategy. He emphasized that the automation would not only help GMCOLAB acquire more customers

and expand its reach but also had the potential to be refined and sold to other SMEs. This strategic vision motivated me to ensure that the work delivered was of high quality and aligned with Gabriel's broader business goals. Although Andrew, the CTO, was focused on direct client work with clear deadlines, he could potentially refine the automation MVP in the future if GMCOLAB decides to do so.

A significant aspect of the project involved the development of a custom Python script to address specific data extraction needs that existing tools like Linked Helper and PhantomBuster could not fulfill. I developed this script independently to accelerate the development process and troubleshoot effectively, I utilized generative AI, specifically GPT-4o, which was particularly proficient in guiding me through the use of the Selenium library for browser automation and helping to implement it into the script. This is a prime example of how I actively used generative AI to expedite my work, particularly for technical tasks like coding. Although generative AI was not the primary focus during this phase of the project, it was used at the end of the automation workflow, generating personalized messages and posts based on the extracted data.

In the next section, "LinkedIn Network Connection Segmentation," the focus shifts from acquiring new potential clients to analyzing and enhancing Gabriel's existing LinkedIn network.

5. Second sub-Project: LinkedIn Network Connection Segmentation

5.1. Introduction and Contextualization

Building on the foundational work established in the LinkedIn Lead Generation Automation, this phase shifts focus to optimizing interactions within Gabriel's existing LinkedIn network. While the lead generation project targeted potential clients outside of Gabriel's immediate network—such as 2nd-degree connections, LinkedIn event groups, and users interacting with posts and ads—this segmentation project emerged from the need to better understand and engage with current connections. As Gabriel's network grew, maintaining up-to-date and relevant information about these connections became increasingly challenging. The project aims to create a more structured and dynamic approach to managing these relationships, ensuring that Gabriel can continue to engage meaningfully with his network.

The use of generative AI becomes more integral in this phase, moving beyond its minimal application in the lead generation project. By enhancing profile information with additional data points, such as language proficiency, this project enables Gabriel to segment his network more effectively, focusing on building a local/regional network of SMEs in the Flemish region and the Netherlands. The goal is not to expand globally but to target a specific audience that faces growth and optimization challenges that GenAI can address. This focus ensures that Gabriel's efforts are both strategic and aligned with his business objectives, allowing for more targeted and meaningful engagement with clients, customers, and business partners. The following sections will delve deeper into how generative AI was embedded into automation processes, leading to higher quality and more consistent outputs. This includes the application of a prompt engineering framework (RACEF) to refine and optimize engagement strategies.

5.2. Defining Requirements and Objectives

Gabriel faced a challenge in keeping his LinkedIn network connections up-to-date. As he gained new connections, they would not automatically appear in the network, creating an update problem that he wished to automate. This was the first important aspect of the network connection segmentation pipeline. To further segment the data, GenAI was used to enhance profile information, adding crucial data points such as whether a person speaks Dutch or not. This enhancement was essential since Gabriel focused on clients in the Flemish region and the Netherlands. His goal was to create a local/regional network of SMEs facing growth and optimization challenges that GenAI could address.

Adding these data points allowed Gabriel to filter and identify specific profiles that could become valuable clients. After enhancing the data, the plan was to transfer it from a CSV file to Airtable[7], a CRM platform. Airtable's tagging capabilities and automated communication features, such as cold emails and messages, made it an ideal choice. This setup allowed Gabriel to invite prospects to seminars or notify them about relevant opportunities.

In addition to network enhancement, Gabriel needed to visualize his network and evaluate his LinkedIn activity, particularly interactions with his posts. Using PhantomBuster, a pipeline was created to extract daily data on likes, comments, and views for each post. This information was then plotted in Google Sheets to identify trends and measure the effectiveness of Gabriel's LinkedIn activities. These visualizations provided valuable insights into how his network responded to his posts and connection requests, helping to quantify his efforts on LinkedIn.

These two workflows were crucial for Gabriel to visualize his network, target the right prospects, and refine his business strategies. They enabled him to sell products to the same niche audience and reduce advertising costs by providing LinkedIn with precise targeting information.

5.3. Network Connection Segmentation: Step-by-Step Automation

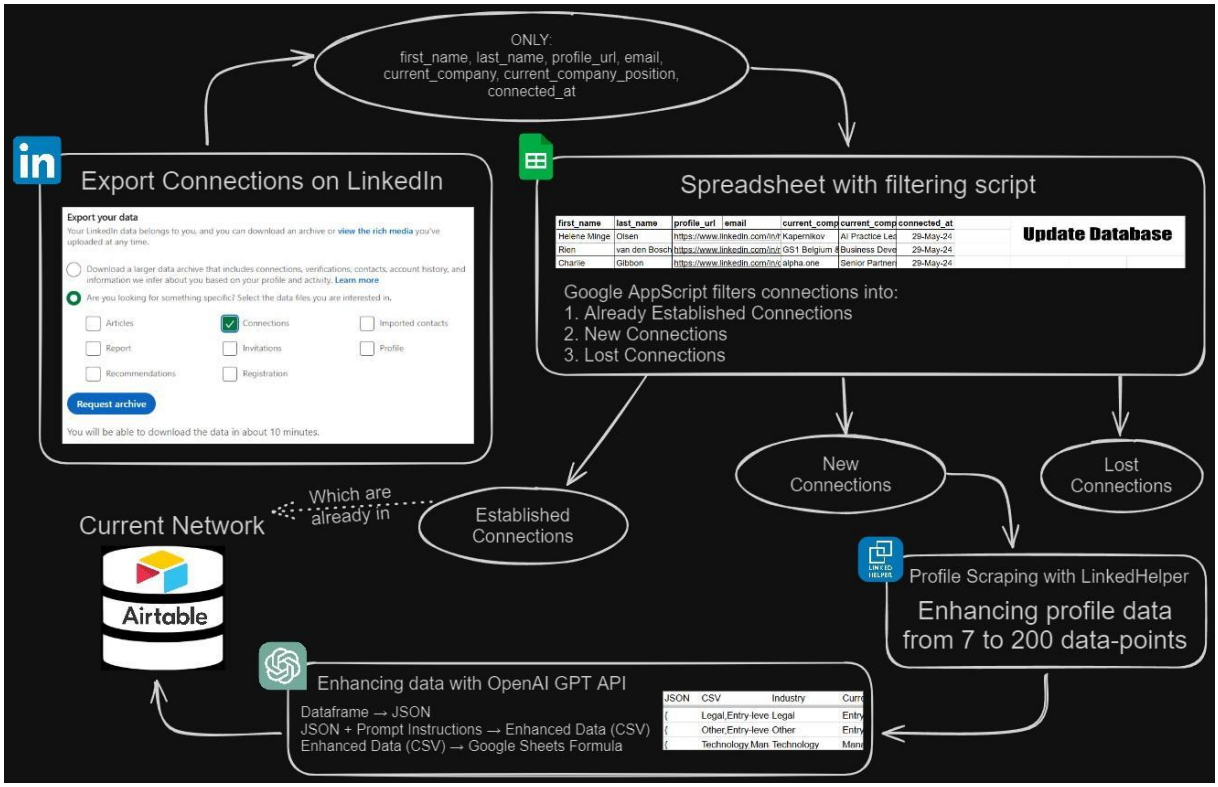
The process of optimizing Gabriel's LinkedIn network required a structured approach to ensure that his connections were accurately captured, enhanced, and kept up-to-date. One of the initial challenges encountered was the need to manually extract first-degree connections from LinkedIn, as no API solution was available to automate this task. Given the dynamic nature of Gabriel's LinkedIn network—where connections are continually being added or lost—it was crucial to implement a method that would allow for the regular updating of this data without redundant reprocessing. The plan is to run this automation once per month, as the manual tasks involved are not time-intensive and can be easily managed within this timeframe.

However, the most time-consuming aspect of this process is scraping the newly added connections with Linked Helper. Due to the need to implement cooldown times to avoid triggering LinkedIn's anti-scraping mechanisms and potential bans, scraping each connection takes between 1 to 2 minutes. If all 3,500 of Gabriel's connections were to be scraped again, it would take nearly four days of continuous scraping. This constraint made it essential to develop a system that filters out connections that have already been scraped, allowing the focus to remain on new connections that need to be processed. To address this, a Google Sheet powered by a custom Google Apps Script was developed. This tool played a pivotal role in filtering out lost connections and identifying new ones that had not

[7] "Airtable is a cloud-based platform for creating and sharing relational databases." (Zapier, n.d.)

yet been enhanced. The goal was to streamline the process, ensuring that only the most current and relevant profiles were processed through the data enhancement pipeline, which will be detailed in the subsequent steps. This approach not only saved time and resources but also ensured that Gabriel's network remained as accurate and effective as possible for targeted outreach and engagement.

Figure 10: Data collection for Network Connection Segmentation



1. Manual Extraction:

The first step involved manually extracting Gabriel's first-degree connections from LinkedIn settings, producing a CSV file with basic profile information. Although not ideal due to the lack of an API solution, this manual process was necessary to ensure that Gabriel's network data was accurately captured and ready for further enhancement.

2. Data Enhancement:

Initially, this data was enhanced using Linked Helper. However, due to its slow processing speed to avoid bans, a new approach was developed. A Google Apps Script was created within a Google Sheet to filter already enhanced profiles and isolate new connections. This significantly reduced scraping time and costs associated with Linked Helper and the OpenAI API, as it eliminated the need to re-enhance previously scraped profiles.

3. Data Transfer to Airtable:

Enhanced data was then transferred to Airtable, allowing Gabriel to apply multiple filters, such as sector and specific needs, and manage profiles in a dynamic database.

Figure 11: Part of the Enhanced LinkedIn Connection Data in Airtable Database

Industry	Current Company Position	In BE or NL	Skills	Main Language	Headline	Industry Experience	Business Interests	Professional Goals	Work Preferences
Legal	Entry-level	✓	Other	Dutch	Legal-related	Legal	Consulting	Networking	Full-time
Other	Entry-level	✓	Technical Skills	English	Technology-related	Other	Consulting	Skill Development	Hybrid
Technology	Manager		Web3	English	Technology-related	Technology	Entrepreneurship	Networking	Remote
Technology	Manager		Other	English	Technology-related	Technology	Networking	Networking	Hybrid
Other	Mid-level		Marketing Skills	English	Business-related	Marketing	Consulting	Networking	Full-time
Technology	Intern		Social Media Marketing	English	Technology-related	Technology	Social Entrepreneurship	Networking	Remote
Consulting	Freelancer/Consultant	✓	Marketing Skills	Dutch	Business-related	Marketing	Consulting	Networking	On-site

4. Automated Communication:

The CRM setup in Airtable facilitated automated communication, such as cold emails and LinkedIn messages, to maintain engagement with his network. While this step has not yet been actively implemented, it requires minimal development work and can be easily set up when needed.

5.4. Data Enhancement with Linked Helper for Improved Profile Segmentation

LinkedIn, when accessed directly through its interface, allows for the extraction of a basic set of profile data, including:

- First Name
- Last Name
- Profile URL
- Email
- Current Company
- Current Company Position
- Connected At

While this basic data is valuable, it falls short in providing the depth and breadth of information required for effective profile segmentation and targeted marketing strategies. To address this limitation, Linked Helper was utilized to scrape a multitude of additional data points from LinkedIn profiles, far beyond what is available through standard LinkedIn data extraction. The range of data that can be extracted includes:

- **Basic Profile Information:**
  - Full Name, First Name, Last Name, Profile URL, Email
  - Custom Names, Avatar, Headline, Summary, Location Name, Industry
- **Employment History:**
  - Current Company, Current Company Position
  - Detailed employment history including organization names, roles, durations, and descriptions across multiple positions
  - Organization locations, websites, and domains
- **Education Details:**
  - Multiple education records including degree names, fields of study, start and end dates, and descriptions
- **Contact Information:**

- Multiple phone numbers, email addresses, and messenger handles, including types and providers

- **Additional Profile Attributes:**
  - Skills, Languages, Language Proficiency, Badges (e.g., Premium, Influencer)
  - Social media links, such as Twitter handles and personal websites
  - Detailed message history, including sent and received messages with timestamps

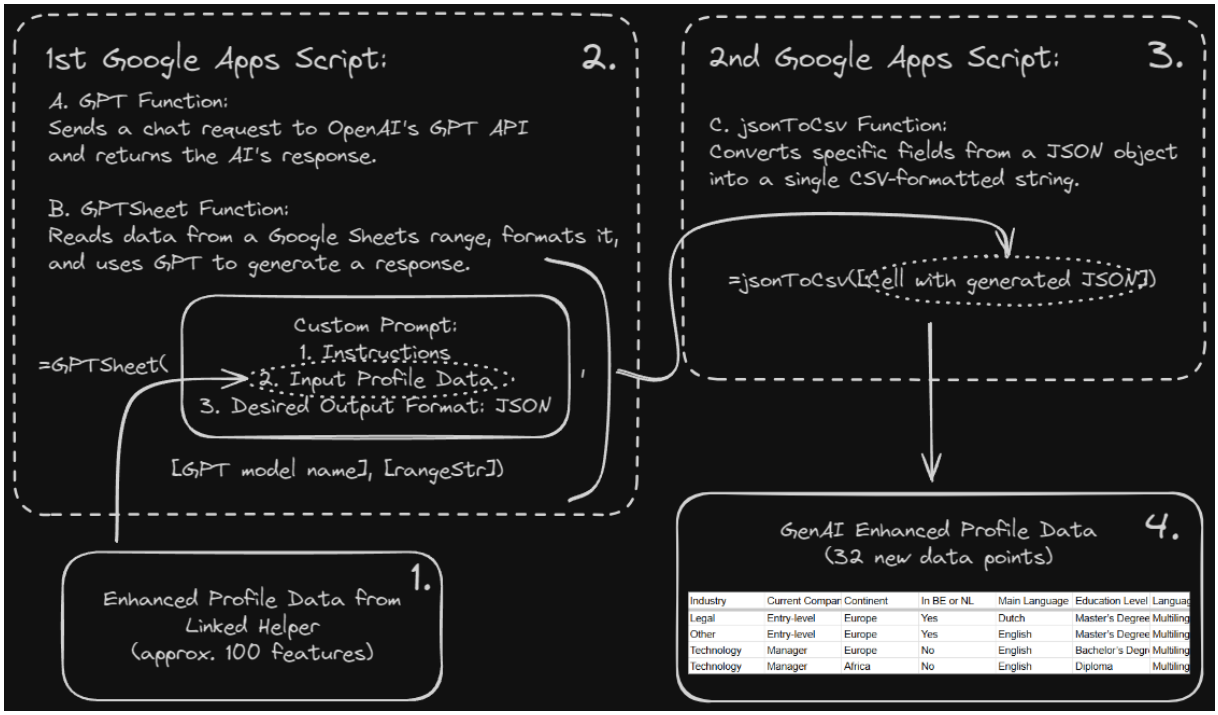
This extensive array of data points allows for a comprehensive view of each LinkedIn profile, facilitating a more sophisticated approach to profile segmentation. By leveraging this detailed information, GMCOLAB can effectively group profiles into distinct segments based on relevant criteria such as industry, company size, or geographic location.

Once this enhanced data is gathered, it is passed into a large language model, specifically GPT-3.5-turbo, using a Google Spreadsheet as the centralized platform for input and output data management. The LLM processes this enriched data to generate additional characteristics that can further refine profile segmentation. These additional characteristics, provide even greater granularity in targeting, enabling GMCOLAB to create highly effective and customized marketing campaigns.

5.5. Leveraging Generative AI for LinkedIn Profile Enhancement and Segmentation

In this section, we delve into how generative AI was utilized to enhance the previously scraped LinkedIn profile data, specifically tailored for GMCOLAB's needs. The entire process was centralized within Google Sheets, allowing for seamless integration of inputs into the LLM and efficient management of the outputs generated. This setup provided a unified platform for data processing, ensuring consistency and ease of access.

Figure 12: Generative AI for LinkedIn Profile Enhancement Workflow



The LLM, specifically GPT-3.5 Turbo, was employed to enrich the scraped LinkedIn data by categorizing profiles based on several critical dimensions that are particularly valuable for GMCOLAB. GPT-3.5 Turbo was chosen over GPT-4o due to its cost-effectiveness, being an order of magnitude less expensive, and its reliability, which was confirmed through extensive testing.

These dimensions included:

- "**In BE or NL**": Determines whether the profile is located in Belgium or the Netherlands, essential for targeting GMCOLAB's primary market.
- "**Current Employment Status**": Classifies the individual's current work status, such as employed, self-employed, or seeking opportunities, which is crucial for understanding their professional context.
- "**Current Company Position**": Classifies the individual's role within their company, which is crucial for understanding their decision-making power.
- "**Main Language**": Identifies the primary language of the profile, helping to tailor communication strategies, especially important for targeting Dutch-speaking SMEs.

These dimensions represent a short selection from a comprehensive list of 32 dimensions used in the categorization process. The full list of dimensions is available in appendix B for further reference.

To achieve consistent and high-quality outputs for these dimensions, a carefully engineered prompt was used. The prompt instructed the LLM to categorize each profile according to these key dimensions, using predefined labels. For example, the prompt included instructions like:

"Your task is to categorize a LinkedIn profile based on its primary features into the following dimensions: 'In BE or NL', 'Current Employment Status', 'Current Company Position', and 'Main Language'. For each dimension, choose the most appropriate label. If a feature is missing or not applicable, write 'n/a'. The output should be a JSON object with all dimensions as keys, ensuring that no field is left empty."

This prompt was meticulously developed after numerous iterations to ensure consistent and accurate results, which were not achieved with earlier approaches. The full prompt is featured in Appendix I.

To support this process, several custom Google Apps Scripts were developed specifically for this automation:

1. "GPT" Function: This function sends a chat request to OpenAI's GPT API and returns the AI's response. It handles the communication with the API, ensuring that the model receives the system and user inputs correctly and that the response is processed effectively.
2. "GPTSheet" Function: This function reads data from a specified range in Google Sheets, formats it into a prompt, and then calls the GPT function to generate a response. This allows the integration of live data from the spreadsheet into the AI's processing workflow, making the entire process dynamic and adaptable.

3. “jsonToCsv” Function: After the AI outputs data in JSON format, this function converts specific fields from the JSON object into a single CSV-formatted string. This conversion is crucial for restructuring the data into a tabular format that can be easily managed and analyzed within Google Sheets.

These scripts were developed as part of the iterative process to find the most effective method for enhancing LinkedIn profile data. After testing various approaches, this combination of prompt engineering and custom scripting proved to be the most reliable, delivering consistent and high-quality results across all profile entries.

By leveraging this enriched data, GMCOLAB was able to group profiles into more precise segments, significantly enhancing the effectiveness of their targeted marketing and advertising efforts. This data-driven approach not only improved the accuracy of their campaigns but also laid the groundwork for future refinements in profile segmentation and marketing strategy.

5.6. LinkedIn Activity Visualization and Engagement Analysis

The second workflow, termed the LinkedIn Activity Visualization and Engagement Analysis, plays a crucial role in GMCOLAB's overall marketing strategy by providing insights into the effectiveness of Gabriel's LinkedIn activities. This workflow specifically focuses on evaluating the performance of Gabriel's posts by analyzing daily data on interactions such as likes, comments, and views.

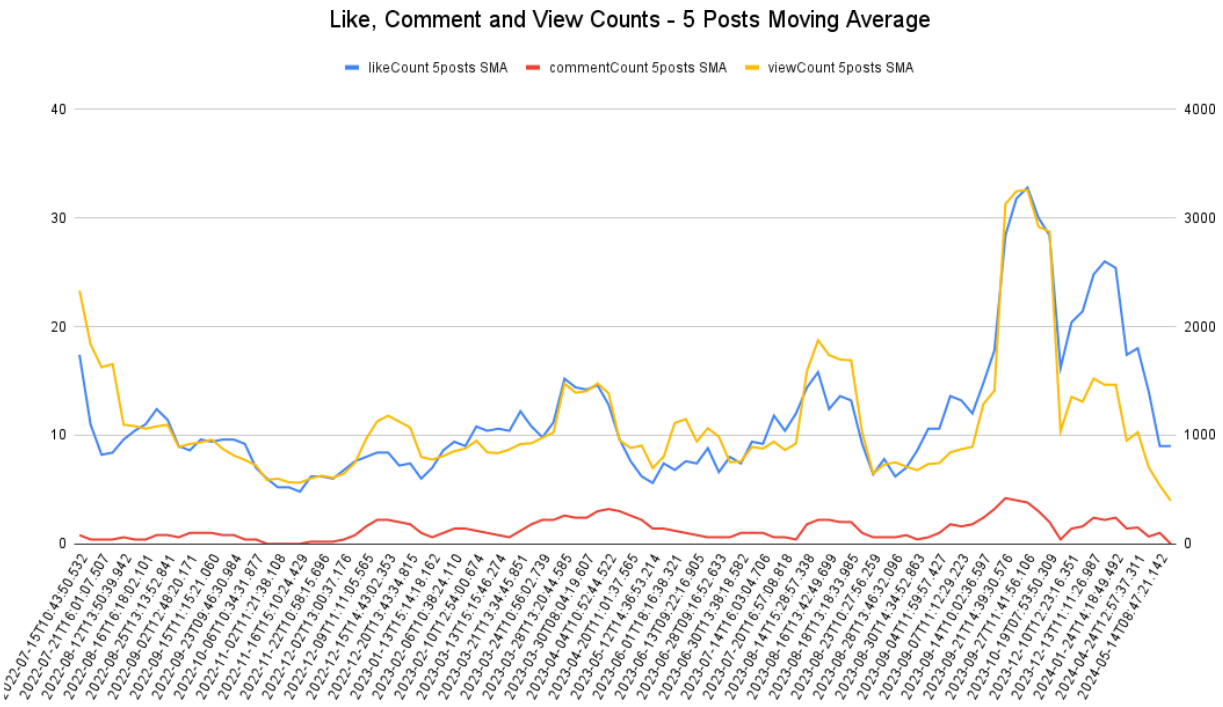
Using PhantomBuster, data on post interactions is automatically scraped every day at 7 AM. The primary objective of this workflow is to quantify and evaluate how well Gabriel's posts are performing on LinkedIn. This is achieved by systematically collecting interaction data and analyzing it within Google Sheets. The data extracted by PhantomBuster is then manually inputted into a Google Sheet, where a set of predefined functions automatically calculate key metrics and generate visualizations. These visualizations, including graphs and charts, help in identifying trends and measuring the effectiveness of Gabriel's LinkedIn activities.

This process complements the network segmentation system, which provides an overview of Gabriel's LinkedIn connections and profiles. While the segmentation effort focuses on understanding and categorizing Gabriel's network, the engagement analysis initiative aims to assess how the network responds to his posts and connection requests. By combining insights from both approaches, Gabriel can make informed decisions about his marketing strategies.

For example, if a specific niche within Gabriel's LinkedIn network, such as plumbers, shows interest in AI automations, he can tailor his posts to address this group's needs. After posting targeted content, the engagement analysis workflow allows him to track the post's performance, examining metrics like word count, topics, and the presence of links. By analyzing this data, Gabriel can refine his marketing communication, making posts more relevant and engaging for specific groups. This iterative process helps GMCOLAB optimize its marketing efforts, ultimately aiming to convert engaged network members into long-term clients who seek custom services and software solutions from GMCOLAB.

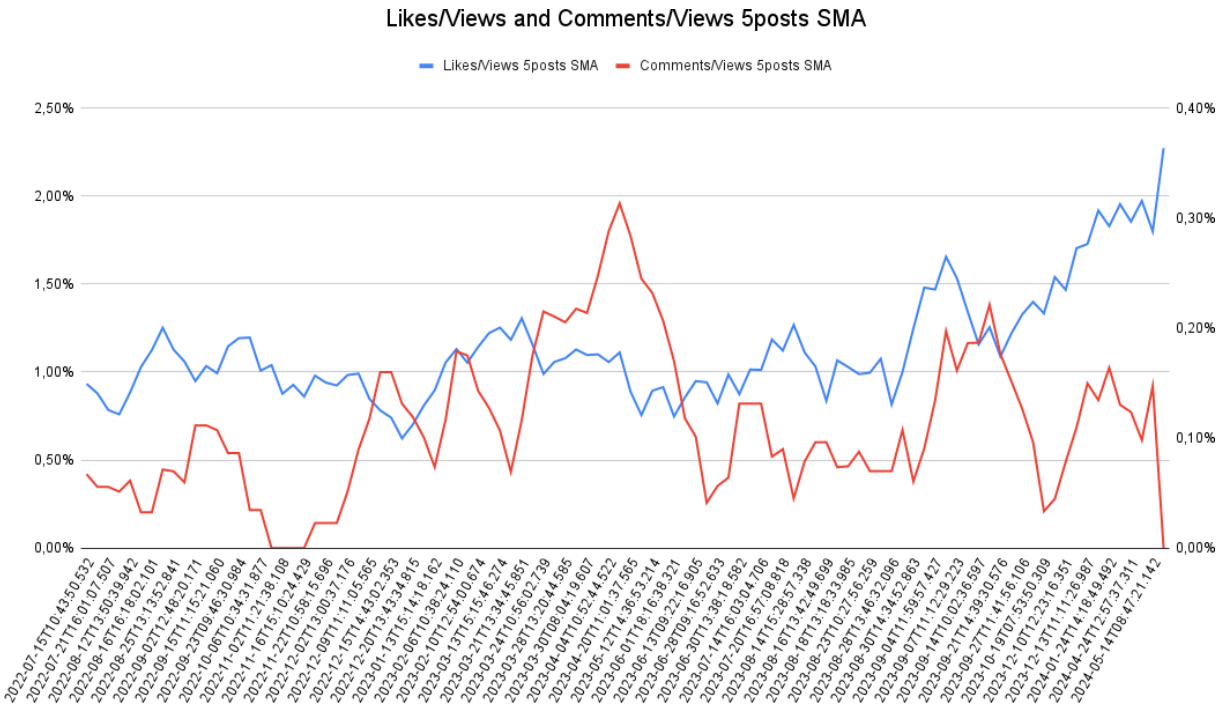
Below you will find some results of Gabriel's LinkedIn posts performances.

Figure 13: 5 Posts Simple Moving Averages of Like, Comment, View Counts - July 2022 to May 2024



The data from LinkedIn Posts automation shows a noticeable impact on like, comment, and view counts during the beginning of Kilian's internship. The five-post moving averages reveal a significant increase in these metrics. Before September 2023, the average view count was around 1,000. Post-September, this number jumped to 3,000 views per post. This sharp rise indicates a boost in engagement, likely due to Kilian's efforts, resulting in higher visibility and interaction with Gabriel's posts.

Figure 14: 5 Posts Simple Moving Averages of Like/Views, Comment/Views - July 2022 to May 2024



Analyzing the ratio of likes to views over time also reveals a positive evolution. The proportion of likes per view grows chronologically, signifying that Gabriel's network became increasingly interactive with his content. This trend suggests that as Gabriel continued to post, his audience engaged more actively, enhancing the effectiveness of his LinkedIn presence and indicating successful content strategies.

Figure 15: Correlations with Character Count of Gabriel's LinkedIn Posts

vs. Post Length	Correlations
Like Count	0,13
Comment Count	0,11
Repost Count	0,03
Likes/Views	-0,04
Comments/Views	-0,11
Comments/Likes	-0,09
Reposts/Views	0,11

The correlation table examining the relationship between post length and various engagement metrics (like counts, comment counts, repost counts, likes per view, comments per view, comments per like, and reposts per view) shows nuanced results. There is a slight positive correlation between post length and the raw counts of likes, comments, and reposts, slightly above 0.1 for likes and comments. Conversely, the ratios such as likes per view, comments per view, and comments per like exhibit a slightly negative correlation with post length. This indicates that shorter posts might lead to a higher proportion of comments per view, suggesting more interaction per viewer. However, the correlations are close to zero, implying that post length does not significantly influence overall engagement levels.

6. Evaluation of Results and Conclusion

6.1. Evaluation of Results

The LinkedIn lead generation and connection segmentation project underwent thorough evaluation, involving retrospective analysis and presentation of results. The process of assessing requirements, exploring tools, and developing automation and data collection pipelines was a significant learning experience. Several challenges were encountered, including connecting APIs and developing custom scripts. Additionally, prompt engineering was crucial to obtain high-quality output for enhanced data points used in the network database for segmenting potential clients.

Increased Efficiency: The automation significantly reduced the time spent on lead generation and customer segmentation tasks. By leveraging tools like Linked Helper and custom scripts, GMCOLAB streamlined its processes, leading to more efficient operations.

Enhanced Insights: The enriched profile data provided deeper insights into Gabriel's network, facilitating more targeted marketing strategies. The ability to filter and segment connections based on enhanced data points, such as company size and language proficiency, allowed for more precise targeting of potential clients.

Scalable Solutions: The modular design of the automation allowed for easy adjustments and scalability for future projects. The integration with platforms like Airtable enabled dynamic management of enhanced profile information, supporting the creation of targeted marketing campaigns.

Post-Tracking Automation: The post-tracking tool demonstrated a positive evolution in network engagement. The ratio of likes to views increased over time, indicating that Gabriel's network was becoming more interactive. This tool provided valuable insights into how Gabriel's posts were received, allowing for adjustments in communication strategies to better engage his audience.

6.2. Continuous Improvement

Throughout the project, continuous monitoring and feedback were essential. Evaluating AI responses over multiple generations was necessary to address biases and ensure consistent, high-quality outputs. Prompt engineering techniques played a crucial role in guiding the generative AI models, ensuring that the data generated was accurate and reliable.

The final iteration of the automation pipeline proved to be consistent and viable for implementation into GMCOLAB's sales resources. The ability to tweak the AI model by refining prompts ensured that the outputs met the company's needs effectively.

6.3. Conclusion

The "Lead Generation and Customer Segmentation on LinkedIn" project represents a significant milestone in enhancing GMCOLAB's marketing and sales strategies, particularly through the innovative use of generative AI and automation tools. This project served as an MVP that proved invaluable to Gabriel and one of his business partners, offering a comprehensive overview of Gabriel's LinkedIn network and streamlining the client outreach process. One of the most tangible benefits of this project was the substantial reduction in the costs associated with targeted LinkedIn ads. By providing LinkedIn with enriched profile information, the cost of reaching specific audiences was significantly lowered compared to traditional ad campaigns, where LinkedIn is tasked with identifying the right profiles.

The segmentation of Gabriel's network through this project allowed for the identification of distinct client groups, enabling more informed marketing decisions. For instance, Gabriel could discern which client segments were most profitable and tailor his communication strategies to target these groups. The custom script developed during the project was temporarily useful in filtering profiles based on specific criteria, such as those working in SMEs. This capability accelerated the lead generation process and further reduced advertising costs by narrowing the target audience.

However, the development of the "LinkedIn Activity Visualization and Engagement Analysis" component encountered challenges, particularly in automating the update of post data. While full automation was not achieved, the visualizations created still provided Gabriel with valuable insights into the positive trends in engagement on his LinkedIn posts. Although this remains an MVP, it holds potential for future development, especially in evaluating and refining advertisement strategies based on quantitative analysis of follower interactions.

The discovery and implementation of Linked Helper proved to be one of the most beneficial outcomes of this project. As a tool, Linked Helper was not only cost-effective compared to its competitors, but it also allowed for efficient organization and export of leads into CSV files, facilitating further analysis

with machine learning or generative AI. This capability was crucial in enhancing GMCOLAB's lead generation and customer segmentation efforts.

The project naturally evolved into two distinct sub-projects. Initially, the focus was solely on lead generation, but the realization of Linked Helper's utility prompted the expansion into network analysis and segmentation. This shift was also driven by Gabriel's emphasis on building a community of entrepreneurs and SME managers, where understanding and expanding his LinkedIn network became a strategic priority. By analyzing this network, Gabriel could more effectively nurture relationships with potential clients, ultimately leading to increased sales and stronger community engagement.

The development phase of this project was not without its challenges. Technical difficulties arose that required a practical and managerial approach to resolve. This experience highlighted an important consideration for businesses: the trade-off between using premium tools with all necessary features versus integrating multiple, lower-cost tools to achieve automation. In some cases, the benefits of using a more expensive, feature-rich tool outweigh the costs and complexities of connecting multiple systems.

Another critical insight from this project is the degree of dependency a company is willing to accept on third-party software. While platforms like Make significantly accelerate the development of automations, there is a strategic consideration about whether a company should eventually develop these automations in-house. This decision hinges on the company's size, as well as its human and financial resources. For smaller enterprises, leveraging no-code platforms may be the most efficient approach, while larger organizations might opt for in-house development to ensure greater control and independence.

Generative AI played a pivotal role throughout this project, even if its contributions were not always highlighted. In the "LinkedIn Lead Generation Automation" phase, AI was instrumental in generating personalized content based on GMCOLAB's marketing strategy and extracted LinkedIn profile data. The ability to send highly personalized messages at scale offers immense potential for client outreach, particularly for SMEs with limited sales and marketing resources. This approach could also be applied in other contexts, such as business partnership outreach or even job searching, where personalized messages could replace traditional CV submissions, offering a more natural and potentially advantageous form of communication.

In the "LinkedIn Network Connection Segmentation" phase, generative AI was used to enrich profile data within Gabriel's network, allowing for segmentation across multiple dimensions. These enhancements provided Gabriel with a clearer overview of his network, enabling rapid filtering of profiles most relevant to his business goals, such as those working in SMEs in Belgium and the Netherlands who speak Dutch as their primary language.

Communication and team dynamics was also instrumental in the success of this project. Gabriel was clear about the objectives and frequently reviewed progress, providing the necessary tools and insights from his previous experience. This support allowed for more efficient decision-making during the research phase, enabling the team to quickly determine which tools to keep or eliminate. However, the freedom given to explore solutions occasionally led to time loss, as the team spent too much time researching rather than settling on a solution and implementing it.

The lack of precise deadlines, particularly in the exploratory phase, contributed to communication challenges, as the team was less insistent on setting clear timeframes for task completion. This phase's inherently unpredictable nature made it difficult to quantify the work involved and determine when to transition from research to development. Despite these challenges, Gabriel's flexibility, coupled with his demand for results, fostered a dynamic environment where brainstorming sessions often led to the best solutions for the problems at hand.

In conclusion, this project not only provided valuable tools and insights for GMCOLAB but also highlighted key considerations for businesses looking to leverage generative AI and automation in their operations. Even though these sub-projects were not finalized as complete products, they effectively demonstrated, through their MVPs, the practical ways in which generative AI-powered automations can significantly enhance small business sales operations. By showcasing the ability to scale marketing and sales efforts on a networking platform like LinkedIn, these projects revealed how SMEs can interact with the most relevant individuals for sales or partnership purposes at scale. Furthermore, having a clearer overview of one's network offers a substantial advantage not only to companies but also to entrepreneurs and job seekers, enabling better-fitting business strategy decisions thanks to the higher degree of insight and understanding of their connections.

While quantitative results such as time gained and financial costs avoided are challenging to quantify precisely, these initiatives have demonstrated significant potential qualitative benefits for the company. This includes more informed decision-making, enhanced client engagement, and improved efficiency in lead generation and customer segmentation, all of which contribute to the strategic goals of GMCOLAB.

Part 5: Second Project: Content Repurposing

1. Objective

After working on several seminars and engaging with organizations like Voka[8] and BNI[9], which include SME managers and entrepreneurs as members, Gabriel identified the potential of "freebies" as a powerful marketing tool. Freebies, or lead magnets, are valuable items or resources given away at no cost to attract potential clients and promote the brand. By regularly posting on LinkedIn and Facebook, he attracted collaborators and potential clients. Gabriel then focused on developing these freebies, which could range from useful resources like prompt cheat sheets to more ongoing offerings. This led to the concept of an automated newsletter that serves multiple purposes: it is informative, inspiring, and provides a gateway for followers to explore GMCOLAB's offerings, including seminars, consultation sessions, community engagement, and custom GenAI solutions such as automations, chatbots, prompts, workflows, and GenAI-powered software.

The first major avenue of content repurposing involves **Email Newsletter Automation**. The primary objective here was to establish a proof of concept for automating the transformation of posts and articles into email newsletters in a TLDR (Too Long; Didn't Read) style. By utilizing LLMs for

[8] Entrepreneurial network in Flanders https://www.voka.be/
[9] Referral Networking Organization https://bni-vlaanderen.be/nl/index

summarizing and formatting, and employing automation tools like RSS feeds[10], MailerLite[11], Make, and the OpenAI API, a seamless workflow was created. This process not only included prompt engineering to refine summaries but also involved meticulous documentation of every step, from creating spreadsheets to assembling newsletters and podcast scripts. This initiative allowed GMCOLAB to maintain consistent and relevant content delivery, which is crucial for keeping clients informed and engaged.

The second avenue is **Podcast Automation**, which extends the content repurposing strategy by converting newsletter content into podcast episodes. This involves generating scripts using LLMs and prompt engineering, followed by utilizing voice generation technologies like ElevenLabs[12] for a natural-sounding podcast voice. The integration of tools such as Make and Whisper further automated the podcast episode creation process. This initiative aimed to reach a broader audience by offering the same valuable content in an audio format, making it more accessible and engaging for clients who prefer listening over reading.

The third avenue focuses on **Creating Social Media Content from Product Information and Customer Reviews**. This involves designing a system to automate the creation of social media content based on product details and customer

feedback. By developing precise prompts to generate accurate and engaging social media posts, product descriptions, and marketing content, GMCOLAB could efficiently repurpose existing content for various platforms. The goal is to make it easy for companies to reuse content they have already written into different formats like social media posts, videos, and articles. By refining prompts and creating custom GPTs, businesses can streamline their content creation processes and save valuable time, allowing them to focus on other important aspects of their operations.

Throughout these projects, a significant aspect of the work involved improving prompts and instructions, as well as fine-tuning the parameters of GenAI models, to enhance the quality, consistency, and reliability of the outputs. Each parameter played a critical role in shaping the AI's behavior. A detailed description of these parameters is featured in appendix D (“OpenAI API Documentation,” n.d.).

This continuous learning process was essential for implementing GenAI prompting into multi-step automations that could adapt to various client requirements and use cases, ultimately ensuring that the AI's outputs met the desired standards.

In addition to these automated solutions, developing and refining prompts for multiple clients was a key focus, particularly in content repurposing for marketing and sales. This included creating social media posts, product descriptions, and marketing content that align with the client's branding and objectives. Contributions were also made to seminars by creating prompting exercises and descriptions that helped SME managers and entrepreneurs improve their prompting skills, further demonstrating the practical applications of GenAI in business contexts. Other prompt refinements

[10] "An RSS feed takes the headlines, summaries, and update notices, and then links back to articles on your favorite website's page" (RSS.com, n.d.).
[11] Digital marketing platform that offers email marketing, automations, landing pages, and website-building tools https://www.mailerlite.com/
[12] “Software company that specializes in developing natural-sounding speech synthesis software using deep learning” https://elevenlabs.io/

focused on transcription summarization and transformation, which could be part of meeting and voice note summarizers or query agents, were also worked on for multiple clients. From this work, GMCOLAB succeeded in building a transcription/summarization software solution that is currently being sold to clients.

The projects I worked on during the internship were distinct, but they all shared a common focus on content repurposing. Each project was designed to explore different applications of this approach, whether in written, audio, or potentially visual formats. Gabriel consistently promoted the potential of generative AI to optimize marketing workflows by repurposing content to make it more digestible, engaging, and aligned with specific objectives. This approach not only enhanced the versatility of content but also demonstrated the broad applicability of generative AI across different media types.

2. Risks and Considerations

The field of prompt engineering, which involves crafting precise instructions for LLMs, is rapidly evolving. This nascent discipline is crucial for effectively communicating expectations to LLMs, but it faces significant challenges. One key risk is the unpredictability of the field's future relevance; some believe prompt engineering may become obsolete within months. However, my internship experience has shown that well-contextualized prompts, specifying the desired output format, and reinforcing instructions with examples significantly improve output quality, aligning with client requirements.

The novelty of this field means there is a scarcity of academic and scientific resources. Most available guidance emphasizes the importance of contextualizing prompts, explaining their aims, providing examples of desired and undesired outputs, and focusing on the correct format. During my internship, I relied on Excel sheets with formulas and LLM calls to evaluate outputs. While this method worked, it was not very efficient.

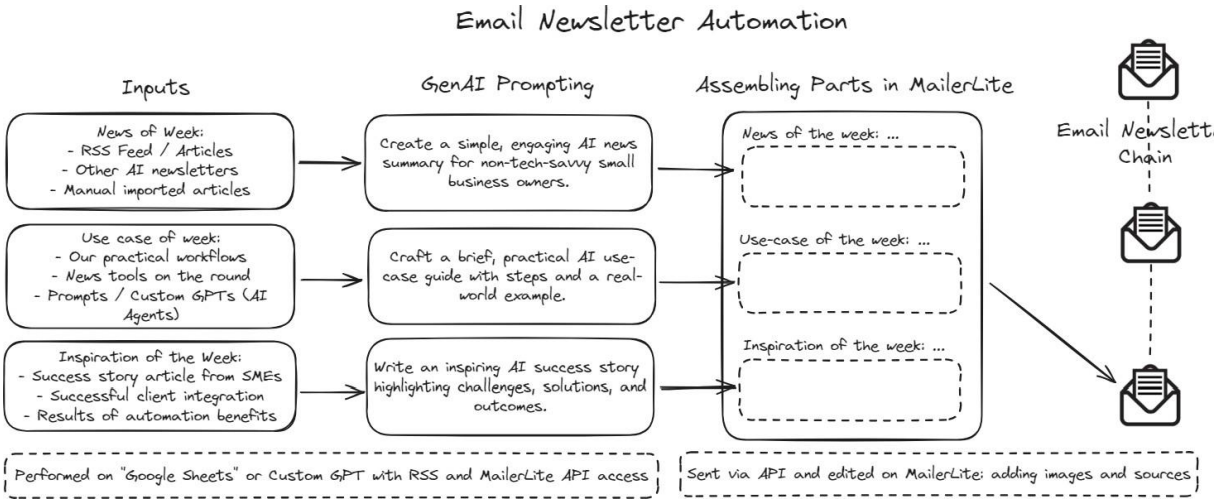
Another consideration is the inherent variability and unpredictability in combining specific prompts, models, and parameters. This makes it challenging to consistently achieve the desired results. Moreover, there is the risk that LLMs may lack creativity and fail to capture the precise communication tone a company desires. Despite these limitations, LLMs are valuable for scaling marketing campaigns and automating processes, which is particularly beneficial for small companies competing with larger firms.

Finally, while LLMs can automate and streamline content creation, they often fall short in delivering the creativity and nuance that human-generated content providers. This gap can affect the quality of marketing materials, making them appear less engaging or authentic. Therefore, it is essential to balance the use of LLMs with human oversight to ensure high-quality, compelling content that resonates with the target audience. To ensure high-quality output, our goal was to recycle content from carefully selected human-reviewed sources. By starting with well-chosen, detailed inputs, we could maintain the depth and precision necessary for effective content repurposing, resulting in more reliable and engaging summaries and transformations across different formats.

3. Content Repurposing Automation Strategies and Applications

3.1. First sub-Project: Email Newsletter Automation

Figure 16: Email Newsletter Automation: From Various Inputs to Curated GenAI Newsletter



The email newsletter automation at GMCOLAB is a key component of Gabriel's strategy to engage community members and eventually convert them into loyal clients. These clients, while similar in size to GMCOLAB, are generally far less tech-savvy. As such, it is crucial to maintain a certain tone and clarity in the newsletters, often requiring the content to be simplified or vulgarized to ensure understanding. The primary goal of this automation is to minimize manual work by creating a system that efficiently collects, processes, and delivers content in a way that's easy for these small to medium-sized businesses to understand and use.

The first step in this automation is sourcing the inputs for the newsletter, which are divided into three parts: news of the week, use case of the week, and inspiration of the week. The news of the week section features one or two notable AI-related business news items from the past week, sourced via RSS feeds or manually imported articles. In the development phase, Killian took the lead in finding these sources, meticulously reviewing various AI and tech outlets, including newspapers and well-known blogs, to curate content for Gabriel's community members. However, the idea was that once the automation was further developed, Gabriel, who regularly reads AI-related content, particularly on AI in business, could easily bookmark articles via a browser extension for inclusion in the upcoming newsletters. These bookmarked articles could then be seamlessly featured in the upcoming newsletters.

The use case of the week highlights practical workflows, tools, or software developed either by GMCOLAB or found online. This section serves as a guide, motivating community members to try out new tools, workflows, or custom GPTs that might benefit their businesses. The inspiration of the week showcases a success story of an entrepreneur or SME owner who has effectively used generative AI to improve their business processes, such as boosting sales or enhancing efficiency. Ideally, this success story would feature a GMCOLAB client, with their permission, to enhance community engagement and foster collaboration.

Once the inputs are gathered, they are processed by an LLM to generate qualitative outputs for the newsletter. For the news of the week, a prompt generates a simple, engaging AI news summary for

non-tech-savvy small business owners, highlighting key points and citing sources. For the use case of the week, another prompt creates a practical guide on using a specific tool or solution, providing detailed instructions and potential benefits. For the inspiration of the week, a prompt crafts a well-rounded success story, detailing the challenges, solutions, and outcomes experienced by a GMCOLAB client.

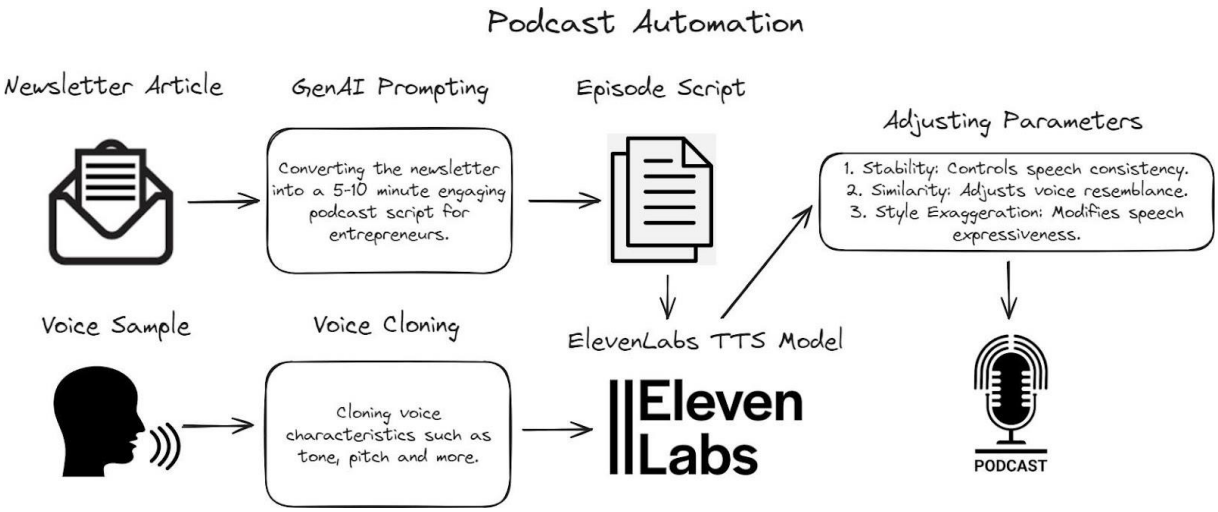
The generated outputs undergo human oversight to ensure they align with the original inputs and maintain a cohesive narrative. This review process can be facilitated using Google Sheets, which connects the RSS feeds and the MailerLite API, the email marketing software used to send the newsletters. Alternatively, a custom GPT can be employed to streamline this process, allowing for easy text modifications through a chat interface.

After validating the content, the final step involves adding images and sources to the newsletter. The MailerLite software then sends the curated newsletter to all GMCOLAB community members. Additionally, a social media post is created to notify followers about the new newsletter, encouraging further interaction and engagement.

This automation, though still a proof of concept, has demonstrated significant potential. While it hasn't been fully developed yet, the initial results show that reducing human intervention and leveraging generative AI can produce valuable, relevant content for community members. The concept is promising and worthwhile for further development. In parallel, Killian was primarily focused on implementing an emailing automation using a software called MailerLite. He worked on creating a sequence of email newsletters that would be automatically sent to Gabriel's community members, complementing the content sourcing and repurposing efforts. With both parts combined successfully, GMCOLAB isn't far from having a fully functioning email newsletter automation.

3.2. Second sub-Project: Podcast Episode Automation

Figure 17: Podcast Automation: From Newsletter Article to AI Powered Podcast Episode



The second automation in the content repurposing initiative during my internship involves converting newsletter content into an AI-powered podcast episode. This idea emerged as an extension of the value proposition established by the newsletter automation. The goal is to recycle the curated newsletter information into a format that is easy to consume, such as a podcast with a very natural, human-sounding voice generated by a text-to-speech model. This approach offers followers of Gabriel,

and potential community members, a convenient way to stay informed while commuting, working out, or during other activities.

The premise of this automation is to create consistent podcast episodes featuring the same topics as the newsletters: the news of the week, the use case of the week, and the inspiration of the week. These episodes are designed to be concise, lasting no longer than five to ten minutes, to ensure they are easy to listen to and digest. Given the audio format, the focus tends to be more on news items rather than detailed guides on specific use cases.

The workflow of this automation begins with voice cloning. GMCOLAB uses software from ElevenLabs to perform text-to- speech conversions by first training a model with a voice sample. This sample, which should be at least five minutes long, captures the voice of a person speaking naturally. The text-to-speech model uses this sample to mimic the voice's characteristics, such as tone and pitch. Once trained, the model is ready to convert text into speech. The next step involves taking the full content of the newsletter article and passing it through an LLM with a prompt that provides clear instructions for transforming the newsletter format into a podcast episode script. This script should be engaging, easy to understand, and no more than ten minutes long. After the script is generated, it undergoes human review to ensure quality and make necessary adjustments before it is passed to the text-to-speech model.

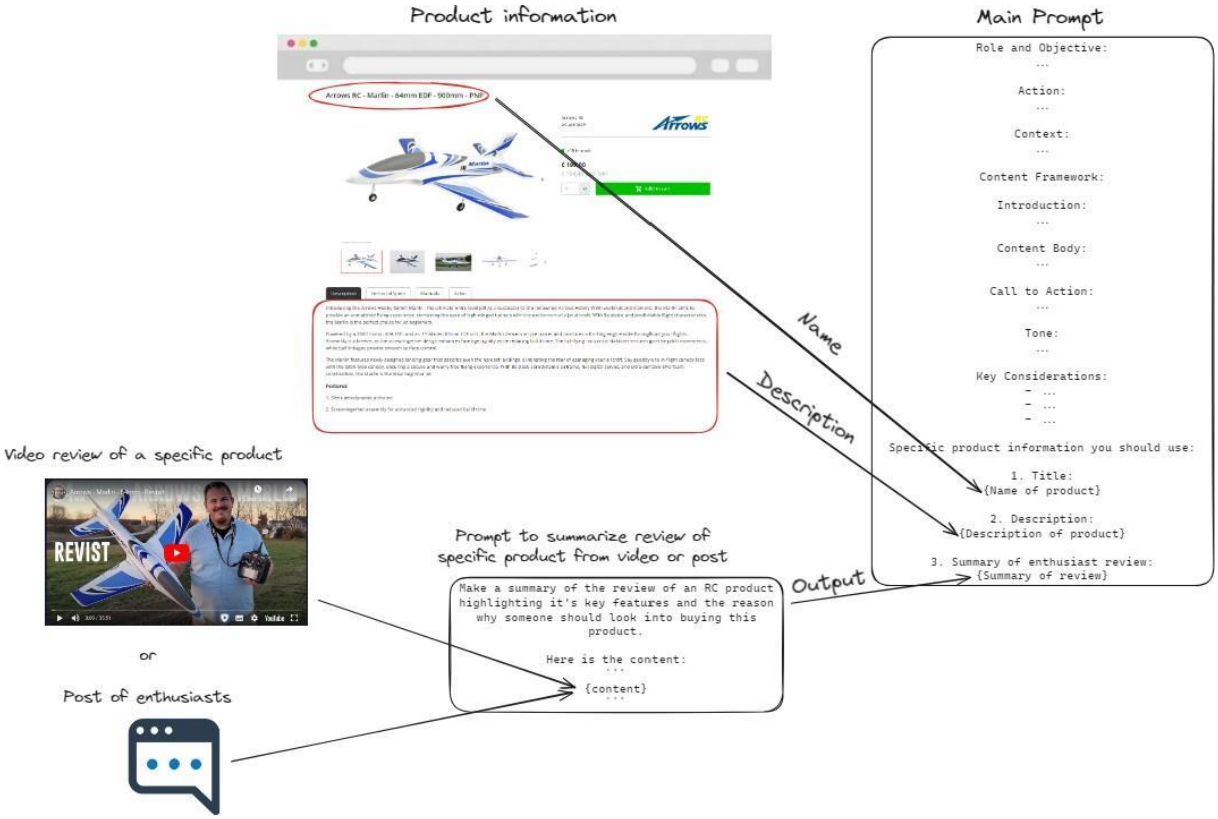
The text-to-speech model, which has been trained on the voice sample, then generates the audio for the podcast episode. This initial output is fine-tuned by adjusting three key parameters: stability (controlling speech consistency), similarity (adjusting voice resemblance), and style exaggeration (modifying speech expressiveness). Finding the right balance for these parameters is crucial to achieving a natural-sounding voice with appropriate pauses and inflections.

After fine-tuning these parameters, the result is an AI-generated podcast episode that is easy to digest for non-tech-savvy entrepreneurs within the GMCOLAB community. This podcast automation provides a free, value-added service to community members, encouraging them to engage with GMCOLAB, collaborate, and potentially seek out GMCOLAB's services. By increasing the network effect and sales, this initiative ultimately contributes to the growth of the company. A short audio sample of AI-generated content, created using ElevenLabs' voice cloning software, is featured in appendix E. This sample was used to demonstrate to a client the effectiveness of AI voice cloning technology.

This podcast automation, much like the newsletter automation, serves as a proof of concept. Both initiatives, while not yet fully developed, have demonstrated significant potential and underscore the value of further investment and refinement.

3.3. Third sub-Project: Social Media Content from Product Information and Customer Reviews

Figure 18: Social Media Post from Product Information & Customer Reviews: Promodels Example



The third automation in the content repurposing initiative focuses on converting existing product information and customer reviews into engaging social media content. Many companies have extensive information about their products, including detailed descriptions and spec sheets, which can be repurposed for marketing and advertising. The key to making this content repurposing efficient is understanding which inputs to use and how to tailor them based on the target audience.

For instance, technical details might not be suitable for leisure products but are crucial for B2B products where buyers require detailed specifications. One example from my internship involved a company selling professional model airplanes, cars, and boats. Their customers are enthusiasts who value technical details, so it was important to incorporate this information effectively.

The process begins by identifying the inputs, which include the product title, description, and spec sheet. Additional inputs such as the transcript of a review video, comments on the video, and posts from enthusiasts are also used. These inputs are combined into a comprehensive prompt for the LLM. The prompt is designed to give the LLM the role of a marketing assistant tasked with creating the perfect social media post, presenting the information in an insightful and engaging manner to excite and motivate enthusiasts.

Developing these prompts requires multiple iterations and evaluations. After several iterations, a highly effective prompt was developed. This approach was applied in a practical setting where Gabriel, during seminars or introductions to generative AI in business, needed to showcase practical examples

using the clients' own products. The goal was to create social media posts that were highly relevant and competitive with existing content on the clients' social media pages.

A noteworthy point in this development was the use of previous posts from a company called CoRally[13]. Providing these examples to the LLM improved the consistency of the output, ensuring that all posts had a cohesive signature style that could be adapted in the prompt.

Another example involved a client in the jewelry sector. Here, the objective was to optimize product titles, descriptions, and keywords for better ranking on Amazon listings, tapping into search engine optimization (SEO). This process also involved prompt engineering and iterations within Google Sheets using the OpenAI API to directly prompt within the interface. The increasing demand for such generative AI applications was evident throughout my internship.

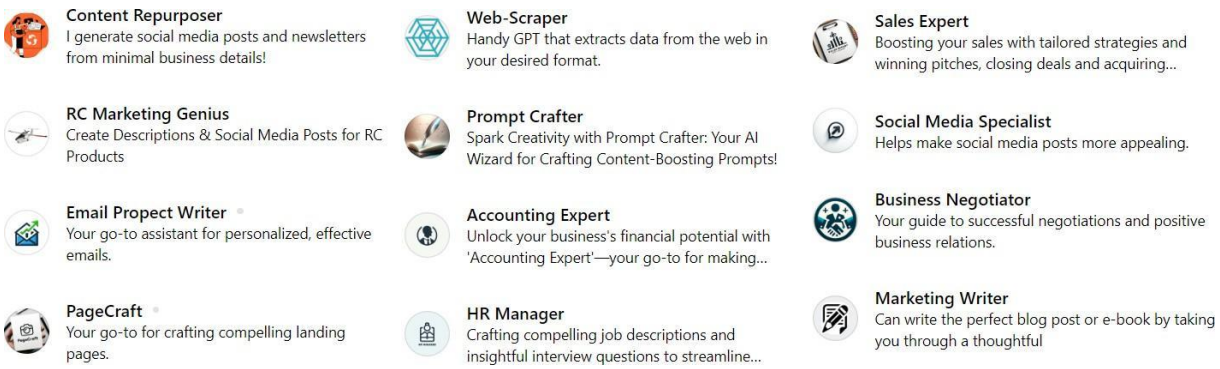
While this initiative is more about prompt development and content adaptation rather than a full automation, it demonstrates the potential for content repurposing. These activities can be enhanced using custom GPT agents, fine-tuned with specific instructions to perform tasks directly. For instance, an AI assistant could take all inputs—product information, review transcripts, and enthusiast posts—and generate the desired content without additional instructions.

Moreover, these activities can be part of a larger automation framework. Additional steps could involve text-to-speech to create short videos presenting the product with stock footage and a natural voiceover. This highlights the versatility and usefulness of such applications in various contexts, making it a valuable addition to the content repurposing strategies explored during my internship.

4. Tools and Methods for Improving Prompts in Content Repurposing Automations

After exploring the three major projects in content repurposing, it is essential to discuss the various tools and methods used to enhance the efficiency and effectiveness of these automations. A significant tool in this endeavor was Google Sheets. This software enabled me to connect different APIs, facilitating prompt testing and evaluation of outputs from LLMs based on prompts and parameter fine-tuning. Google Sheets' ability to integrate with automation tools like Make and Zapier made it possible to create user-friendly, no-code workflows that significantly streamlined the process.

Figure 19: Custom GPTs Developed at GMCOLAB



[13] https://corally.com/en/homepage

In addition to Google Sheets, custom GPTs played a significant role. Unlike Google Sheets, which primarily operates through a spreadsheet interface, custom GPTs allow interaction via a chat interface using the latest version of OpenAI GPT, specifically GPT-4o. These custom GPTs can be configured with specific instructions to act as agents in particular fields or tasks.

Furthermore, they can incorporate a knowledge base of up to 10 files in various formats such as PDF, Word, text files, HTML, and JSON. This capability enables the custom GPT to provide specific answers based on the uploaded documents, making it a powerful tool for quickly retrieving and summarizing information. A practical example of using custom GPTs involves setting up a GPT with class notes and a course syllabus. Instead of manually reading through all the material, users can query the GPT to extract specific information quickly. Here's how you can format the sentence with a footnote for the citation:

Moreover, GPT Actions, a feature of custom GPTs that was added in early 2024, can connect to different APIs to post and retrieve information, enabling dynamic interactions. For instance, a custom GPT can query web pages for the latest weather details, sports scores, or medical news. They can also perform post requests, such as sending information to a database or triggering an automation that updates a cloud drive or sends an email.

Google Sheets was also instrumental in demonstrating prompt evaluation iterations to clients. When clients requested specific prompts for marketing, sales, or customer service activities, the structured format of Google Sheets allowed me to show the detailed work put into fine-tuning and improving prompts, resulting in higher quality outputs.

Throughout my internship, Gabriel focused on seminars, which are the initial steps in onboarding potential clients and integrating them into GMCOLAB's community. These seminars not only showcased various use cases of generative AI in business but also included examples and exercises that helped the audience improve their prompting skills and understand how to interact with LLMs. This approach convinced Gabriel of the benefits of providing the audience with pre-built custom GPTs tailored to different sectors and tasks commonly needed by small to medium enterprises.

During my internship, I developed several custom GPTs to address these needs:

- **Visual Concept Creator**: A creative assistant generating product visuals.
- **Expense Manager**: Helps manage expense receipts by processing photos of receipts.
- **Content Repurposer**: Generates social media posts and newsletters from minimal business details.
- **RC Marketing Genius**: Creates descriptions and social media posts for RC products.
- **Email Prospect Writer**: Assists in crafting personalized, effective emails.
- **PageCraft**: Helps create compelling landing pages.
- **Web-Scraper**: Extracts data from the web in the desired format.
- **Inspiration of the Week**: Generates the "inspiration of the week" section for newsletters.
- **Prompt Crafter**: Sparks creativity with content-boosting prompts.

- **Accounting Expert**: Simplifies complex accounting tasks to unlock business financial potential.
- **HR Manager**: Crafts job descriptions and interview questions.
- **Sales Expert**: Enhances sales strategies with tailored pitches.
- **Social Media Specialist**: Improves the appeal of social media posts.
- **Business Negotiator**: Guides successful business negotiations.
- **Marketing Writer**: Assists in writing blog posts or e-books through a structured process.

These custom GPTs were created to offer them to GMCOLAB's community members, with some being featured as examples in seminars. Tools like the Web-Scraper, Email Prospect Writer, and Content Repurposer were also used internally, significantly boosting productivity. One notable observation was the effectiveness of custom GPTs in reformatting text, particularly in changing programming formats like converting data frames to JSON. This capability proved to be highly efficient and accurate.

In conclusion, the integration of tools like Google Sheets, automation platforms, and custom GPTs has proven to be highly effective in enhancing the prompt development process for content repurposing automations. By leveraging the capabilities of ChatGPT and custom GPTs, GMCOLAB was able to execute very specific tasks with a level of quality that meets professional standards. Beyond just improving output quality, these tools have made it possible to build complex automations with relative ease. This approach offers tremendous benefits for companies, enabling them to implement advanced, cost-effective automation solutions with minimal development time and resources. It serves as a perfect example of how companies can leverage generative AI in the research and development phase, offering low downside and high upside potential.

5. Conclusion

The content repurposing initiatives at GMCOLAB were a central focus throughout my internship, leveraging generative AI to enhance content creation and distribution. Although these projects did not fully evolve into final products, they provided valuable insights and demonstrated the potential of using LLMs to support key company activities like marketing and sales.

The Email Newsletter Automation sub-project showed significant potential for maintaining client engagement by automating the conversion of posts and articles into concise, informative newsletters. The development of effective prompts during this phase, although still at the MVP stage, lays a strong foundation for future development. The workflow created is robust and can be easily refined and expanded if GMCOLAB decides to turn this into a fully operational tool.

In the Podcast Automation sub-project, the focus was on repurposing similar content from the email newsletters into podcast episodes. This included fine-tuning AI voice cloning settings, testing various voice options, and developing prompts that could be reused in future iterations. The practical workflow developed here offers a strong starting point for GMCOLAB or other companies looking to implement similar solutions, whether for internal use or as a sellable product.

The Creating Social Media Content from Product Information and Customer Reviews sub-project highlighted the adaptability of generative AI in marketing. The prompts and workflows developed were directly applied in client work, demonstrating immediate improvements in their marketing efforts. This

sub-project showed that even without full automation, well-structured prompts and clear procedures can significantly enhance a company's social media presence and streamline its sales operations.

Successful content repurposing relies heavily on the quality and creativity of the input material. At GMCOLAB, a human verification step was essential in evaluating the quality of source content before feeding it into the automation pipeline. This ensured that the outputs, whether newsletters, podcasts, or other formats, maintained high standards of quality and engagement. Balancing human creativity with automated processes was key to achieving effective content repurposing.

Interacting with clients to understand their needs and developing tailored prompts deepened my understanding of how generative AI can effectively enhance marketing and sales strategies. Throughout these projects, refining prompts and fine-tuning GenAI model parameters were crucial for improving the quality and consistency of outputs. This continuous learning process benefited GMCOLAB and provided me with valuable experience in problem-solving with LLMs.

The integration of tools like Google Sheets, automation platforms, and custom GPTs played a crucial role in achieving these outcomes. Google Sheets facilitated prompt testing and evaluation, while custom GPTs enabled dynamic interactions and streamlined workflows. However, recently developed tools like Chainforge[14] have simplified the process, allowing for better visualization, quantification, and evaluation of LLM outputs. This shows the growing demand for refined prompt engineering to improve LLM outputs. Companies looking for faster ways to refine prompts should always be on the lookout for new software tools to increase development efficiency.

Interactions among GMCOLAB members, and the learning curve in applying generative AI in business, particularly for SMEs, were significant outcomes of this project. Despite some limitations of LLMs, such as hallucination risks and creativity gaps, these projects effectively demonstrated how generative AI can automate and improve content processes, driving sales and enabling better business strategy decisions.

Through these projects, we made significant progress toward one of Gabriel's key objectives: finding and developing ways to build a long-lasting community around GMCOLAB. This community would stay informed about new AI breakthroughs and become increasingly interested in improving their businesses with generative AI solutions, ultimately leading to more clients for GMCOLAB. Additionally, this groundwork serves as a strong example of how SMEs can effectively use generative AI in marketing and sales. It underscores the importance of selecting the right input content and dedicating time to refining prompts and instructions to achieve more consistent and reliable outputs.

A notable achievement of these initiatives is the financial results derived from the seminars and consultations linked to the project. **These efforts generated €9,640 in revenue, with 147 hours of work, resulting in an average revenue per hour of €43.75.** A total of 12 workshops and seminars were organized, further cementing the project's value to GMCOLAB. All detailed financial results and additional information in form of a Google spreadsheet are presented in appendix F.

[14] "Open-source visual programming environment for prompt engineering" https://chainforge.ai/

Part 6: Third Project: Customer Service Emailing Automation

1. Contextualization and Introduction

For this project, my role as an intern at GMCOLAB expanded significantly. Under Gabriel's supervision, I, alongside Killian, was given the opportunity to take on a client project with increased responsibility. This project involved developing a customer service email automation system for WashConnect, a company specializing in automated laundry services. The contact with WashConnect was established through a friend of Killian, as neither Gabriel nor GMCOLAB had an existing relationship with the company.

Gabriel encouraged us to take the lead in this project, granting us a level of autonomy intended to simulate the experience of running a small company. Our task began with initiating contact with WashConnect, where we analyzed their needs and identified key areas for improvement. Kilian played a crucial role in communicating with the client and setting up the project plan, while I focused on the technical development of the solution.

Throughout this project, Gabriel's involvement was more hands-off compared to other projects, providing guidance from a distance while allowing us to manage the project's direction. This approach gave me the opportunity to develop and implement the technical solution independently, with Kilian managing client relations and ensuring that the project aligned with WashConnect's expectations. The experience was invaluable, as it provided practical insights into client interaction, project management, and the application of generative AI in real-world scenarios. Despite GMCOLAB not having WashConnect as a formal client, the project remains highly relevant due to its commonalities with the rest of the internship and demonstrates a successful implementation of generative AI in an automated sales workflow.

2. Project Challenges

WashConnect, a provider of automated laundry services in Flanders, specializes in the installation and maintenance of self-service laundromats. Their innovative virtual solution allows users to book machines through an application, establishing them as a market leader with over 60 locations. As WashConnect expands into Wallonia and internationally, the volume and diversity of incoming emails have surged, presenting an insightful case for increased administrative burden.

On average, WashConnect receives around 60 emails per week, encompassing refund requests, promotional code issues, and general feedback, often in multiple languages. Caroline, who manages customer support, finds the administrative workload overwhelming despite utilizing AI-powered conversational agents like ChatGPT for drafting emails. The primary challenge lies in efficiently categorizing and responding to these emails while maintaining high-quality customer service.

Beyond email communications, WashConnect faces other significant challenges, such as optimizing their website, creating and managing social media content, and automating their prospecting efforts. These issues underscore the need for a comprehensive solution to improve operational efficiency across various domains. However, the immediate priority is to streamline the customer support process to handle the growing email volume effectively.

This project aims to develop a robust automation system to categorize incoming emails and generate AI-driven responses, significantly improving the efficiency and accuracy of WashConnect's customer support operations. Following a positive outcome, a similar approach could be applied to other areas, such as the previously presented "Lead Generation and Customer Segmentation Automation" to further enhance WashConnect's market reach and operational efficiency.

3. Project Risks

The project involved several risks that were carefully managed to ensure successful implementation. The primary risk was the potential generation of false information by GPT. To mitigate this, a validation step was implemented where generated responses are saved as drafts for human review before being sent, significantly reducing the likelihood of erroneous information reaching customers.

Another notable risk was the emergence of competitive solutions from major technology companies like Microsoft and Google, which are increasingly integrating advanced AI features into their messaging services. Although the solution offers distinct value, it is important to acknowledge the possibility that these companies may develop native solutions that could enhance customer support, presenting a medium-term risk to the project's uniqueness and competitiveness.

Minor risks included potential temporary outages of the OpenAI API, which provides the GPT text generation, and service interruptions from Make/Zapier, the infrastructure providers. While these interruptions are considered unlikely and generally temporary, a one-day response delay was deemed acceptable should they occur. These measures ensured that the project remained resilient against operational disruptions, maintaining overall stability and effectiveness.

4. Objectives

The primary objective of this project is to develop a robust automation system that categorizes incoming emails and generates AI-driven responses, significantly improving the efficiency and accuracy of WashConnect's customer support operations.

4.1. Automation Overview

Email Categorization and Response Generation:

The automation begins by detecting new incoming emails on WashConnect's email server. These emails are analyzed using a generative AI model, which categorizes them into predefined categories such as refund requests, promo code issues, general feedback, and others. The AI model then generates draft responses based on the category, which are logged in a Google Sheet for easy review and validation by Caroline. This process ensures that all customer emails are addressed promptly and accurately, reducing the human workload significantly.

Streamlined Refund Processing:

A specific automation is triggered when a refund request is validated in the Google Sheet. Refunds, unlike other types of emails, involve financial transactions and therefore require a more rigorous process. After Caroline reviews the draft response and verifies the refund details in the Google Sheet, the system captures all relevant data from the selected row, drafts a personalized email response using predefined templates, and sends the email to the customer. The status of the refund request is then updated in the Google Sheet, and the email is moved to a designated folder. This added layer of

verification ensures accuracy and accountability in handling financial matters, making the refund processing workflow both seamless and efficient.

4.2. Robustness and Reliability

To avoid downtime and ensure the robustness of the automation, several measures were implemented:

- **Iterative Development:** The automation was developed iteratively, with continuous testing and refinement to identify and resolve potential issues.
- **Error Handling:** Error handling mechanisms were incorporated to manage unexpected scenarios and prevent operational interruptions in the automation process. Through numerous testing phases, the automation was adjusted to avoid getting stuck, such as implementing a character number cap on the email content (Truncated Email max 2000 char) to prevent surpassing the LLM's context window.

Client Collaboration: Close collaboration with WashConnect was maintained throughout the project. Regular feedback from Caroline and her team ensured that the automation met their specific needs and was fully aligned with their workflows.

4.3. Expected Productivity Gains

Implementing these automations is expected to yield significant productivity gains for WashConnect:

- **Time Savings:** Automating the categorization and initial response generation will drastically reduce the time Caroline spends on email management. This transformation of the task from writing to verification will free up valuable time for other essential activities.
- **Consistency and Accuracy:** Utilizing AI for categorization and response generation ensures consistent and accurate handling of customer emails. This consistency improves customer satisfaction and reduces the risk of errors.
- **Efficient Data Management:** Recording all email interactions in a structured Google Sheet provides an organized and easily accessible database. This setup allows for better tracking and analysis of customer interactions, facilitating data- driven decision-making.
- **Scalability:** The modular design of the automation allows for easy adjustments and scalability. As WashConnect expands, the system can handle increased email volumes without compromising efficiency.
- **Enhanced Customer Engagement:** By quickly and accurately addressing customer inquiries, WashConnect can enhance its customer service experience, leading to higher customer satisfaction.

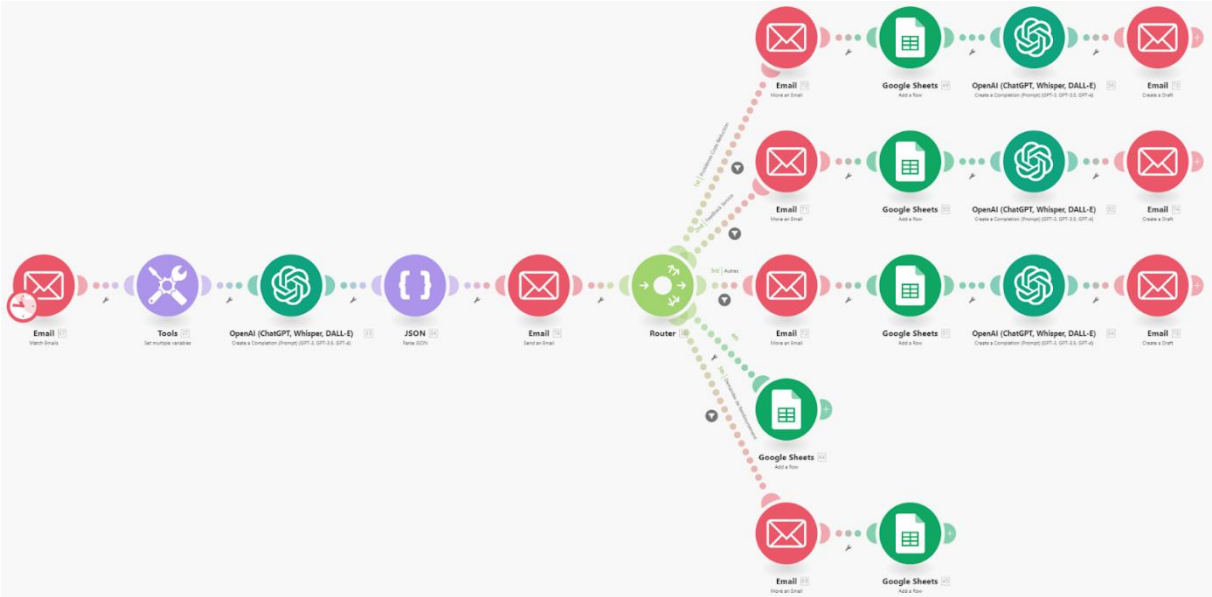
5. Automation Run-Down

The Customer Service Emailing Automation project for WashConnect involved creating two automation scenarios using the no-code platform "Make." These scenarios aimed to categorize incoming customer emails and generate AI-driven responses, significantly streamlining the customer service process. The automation connected multiple APIs and servers, including WashConnect's email

server, the OpenAI API, and the Google Sheets API, to record and manage the emails treated by the automation.

5.1. Email Categorization Scenario

Figure 20: Make automation workflow: Email Categorization Scenario



Step 1: Incoming Email Detection

The automation begins by detecting new incoming emails on WashConnect's email server. These emails can originate from customers' personal email addresses or through the WashConnect app.

Step 2: Setting Variables

Upon receiving an email, the automation sets multiple variables to capture essential information, such as the sender's name, email address, and content. This step also differentiates between emails sent directly and those sent through the app.

Step 3: Categorizing Emails

A prompt is sent to the OpenAI API to analyze and categorize the email content. Emails are classified into one of four categories:

- Refund Request
- Promo Code Issues
- General Feedback
- Other

Step 4: Structuring Data

The categorized email data is structured into a JSON format. This data includes details such as the sender's name, email content, location, and the type of issue reported.

Step 5: Initial Response

An automatic acknowledgment email is sent to the customer, informing them that their case is being reviewed and will be addressed shortly.

Step 6: Data Recording

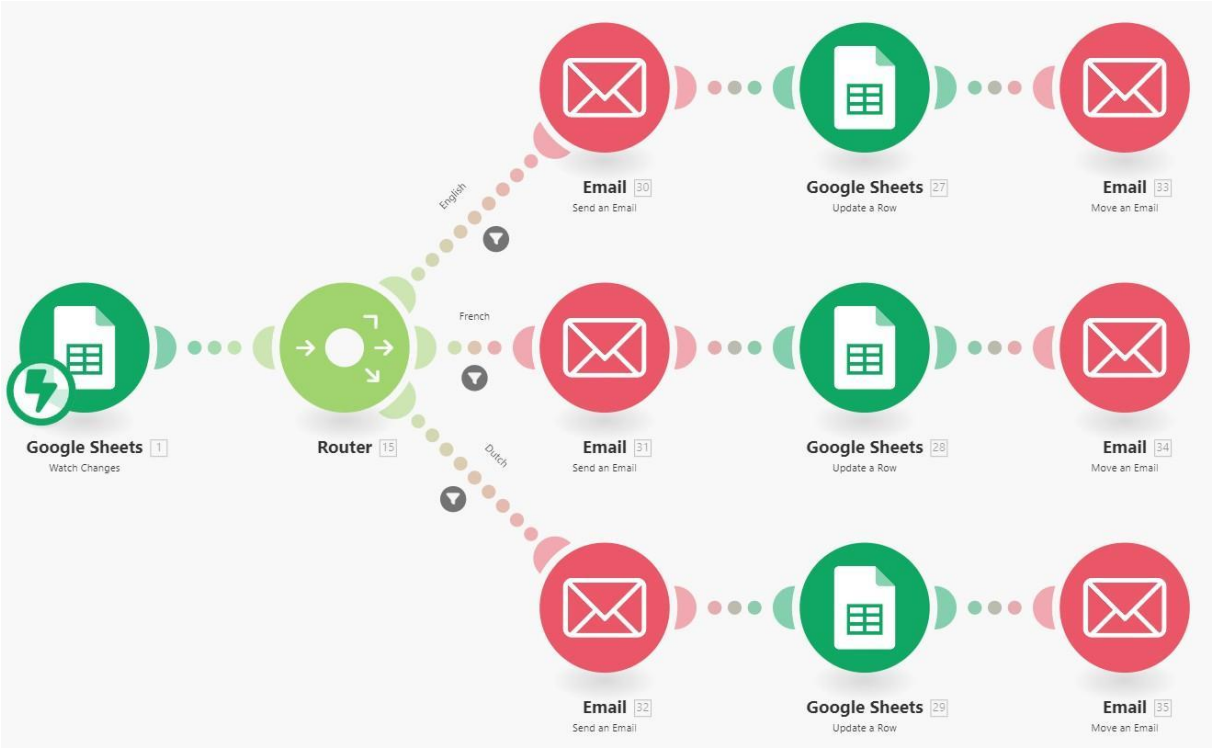
The categorized emails are recorded in a Google Sheet. This sheet includes a summary of all incoming emails, categorized into different worksheets based on the type of issue.

Step 7: Draft Generation

For non-refund requests, a draft response is generated by OpenAI and inserted into the reply email. This draft is then reviewed by a customer service representative before being sent.

5.2. Refund Accepted/Rejected Scenario

Figure 21: Make automation workflow: Refund Accepted/Rejected Scenario



Step 1: Triggering the Automation

This automation is triggered when a WashConnect employee clicks the validation button for a specific refund claim in the Google Sheet.

Figure 22: Validating Refund Request through Google Sheet

Email Address	Amou	Observations	Approve Refun	Email Sent
gour@skynet.be			☐	
sypholeumaleu15@gmail.com	6,60€	Déjà fait	☐	
india.check@icloud.com	4,20		☑	Sent!
ginnylaumen@live.nl	2,20€	Déjà fait	☐	
somonnitaroy07@gmail.com	4,20		☑	Sent!
ekwe.alain@gmail.com	4,20		☑	Sent!
anthony.amorosi@gmail.com	4,20		☑	Sent!
delphine.lin2000@gmail.com	4,20€	Déjà fait	☐	

Step 2: Capturing Data

The automation captures all relevant data from the selected row in the Google Sheet, including the customer's details, the language of communication, and the specifics of the refund request.

Step 3: Drafting the Response

Based on the captured data, an email draft is created using pre-defined templates. This process does not utilize the OpenAI API, saving on API usage costs. The draft includes personalized information and variables specific to the customer's situation.

Step 4: Sending the Email

Once the draft is reviewed and the refund request is approved, the email is sent to the customer through the "Approve Refund" function (by ticking the checkbox) directly in the spreadsheet. This functionality allows the employee to validate the refund without needing to manually handle the email, ensuring that there is still a human check in place. This step maintains the necessary oversight while optimizing the process, making it efficient yet secure.

Figure 23: Automatic Email Template with Name Variable

Dear {{1.rowValues[].`6`}},

We offer our sincere apologies for the inconvenience you experienced while using our services.
As compensation, we would like to offer you a discount code for a period of 30 days. This code will be sent to the email address registered in our system in the coming days.

We appreciate your understanding and patience during this period. If you have any further questions or concerns, please do not hesitate to contact us.

We are here to assist you in any way we can.

Best regards,

CAROLINE SILVA
Support Manager

Only available on Fridays from 8am to 5pm.
T: + 32 15 48 18 10
A: Hendrik Consciencestraat 18/6 - 2800 Mechelen
E: service@washconnect.eu
www.washconnect.eu

Step 5: Updating Records

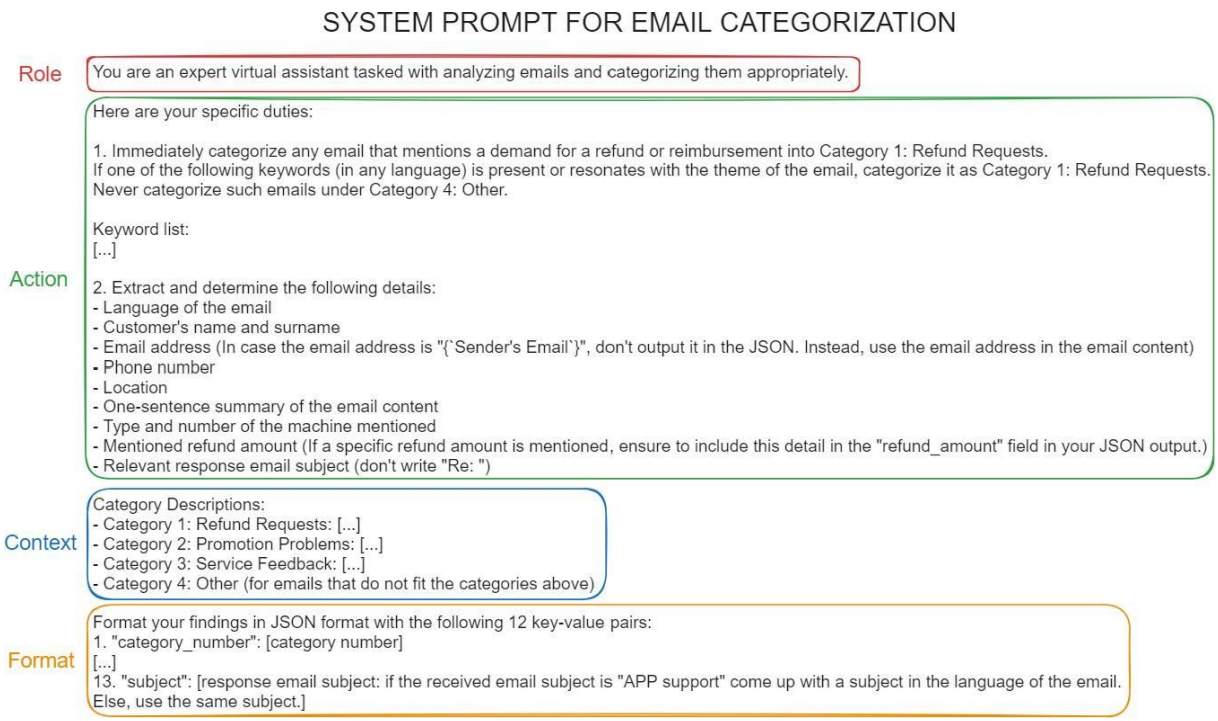
The Google Sheet is updated to reflect that the refund request has been processed. The email is moved to a subfolder in the email server, labeled "Refunds Treated" or "Accepted and Validated."

6. Prompt Engineering and GenAI Model Selection

6.1. Prompt Engineering

To ensure the success of this automation, prompt engineering plays a crucial role. Good prompt engineering is essential for generating relevant responses and making correct categorizations consistently. By crafting precise and clear prompts, the AI model can accurately interpret and respond to the varied content of customer emails. This reduces the likelihood of errors and ensures that the responses meet WashConnect's quality standards.

Figure 24: Prompt Engineering with RACEF Framework: System Prompt for Email Categorization



The prompt follows the RACEF framework, as described by Young (2024), ensuring clarity and precision, which increases the effectiveness of categorizing incoming emails:

- **Role**: The AI acts as an "expert Virtual Assistant" for email analysis and categorization.
- **Action**: Specific tasks include categorizing emails and extracting key information, e.g., "categorize any email mentioning a refund into Category 1."
- **Context**: Includes keyword lists, detailed category descriptions, and specific instructions to align responses with operational goals.
- **Execute & Format**: The LLM is instructed to produce JSON output with 12 key-value pairs, ensuring consistent and accurate categorization. These key-value pairs represent the extracted characteristics of incoming emails. Here is the list: *category_number, category, summary, language, name, surname, email, phone_number, location, machine_type, machine_number, refund_amount, subject.*

This approach reduces manual corrections and enhances efficiency, demonstrating the effectiveness of the RACEF framework.

6.2. Selecting the Adequate LLM and Improving Outputs

Choosing the right language model for both the categorization step and the response drafting step was a crucial part of the project. The goal was to ensure high accuracy in email categorization, particularly in identifying reimbursement requests, and to reduce manual corrections.

The most critical aspect was minimizing false negatives and increasing true positives for the "Refund Requests" category.

Correct classification of the remaining categories was important but secondary to the accuracy of identifying refund requests.

To assess the performance of both GPT-3.5 and GPT-4o, as well as the effectiveness of different prompt designs, a set of 69 emails previously categorized as "Refund Requests" by Caroline was used for testing.

Initial Results with Sub-Optimal Prompt

With a sub-optimal prompt that did not emphasize refund requests and lacked specific keywords, the results were:

Model	Correct Refund Requests	Promo Code Problems	Service Feedback	Other
GPT-3.5	42	10	9	8
GPT-4o	57	5	4	3

Improved Prompt Design

An improved prompt was designed to focus primarily on correctly classifying refund request emails by including specific keywords:

Added instruction part:

1. Immediately categorize any email that mentions a demand for a refund or reimbursement into Category 1: Refund Requests. If one of the following keywords (in any language) is present or resonates with the theme of the email, categorize it as Category 1: Refund Requests. Never categorize such emails under Category 4: Other.

Keyword list:

"Refund", "Overcharged", "Double charge", "Credit card issue", "Refund request", "Compensation", "Money back", "Return my money", "Deducted", "Overpayment", "Payment issue", "Charged twice", "Transaction error", "Incorrect charge", "Billing mistake", "Dispute charge", "Reimburse", "Credit refund", "Unsuccessful payment", "Money deducted", "Chargeback", "Cancel payment", "Reverse charge", "Payment reversal", "Excess payment", "Overbilled", "Unauthorized charge", "Financial adjustment", "Refund my balance", "Payment discrepancy"

Results with the improved prompt

Model	Correct Refund Requests	Service Feedback	Promo Code Issues	Other
GPT-3.5	53	10	4	1
GPT-4o	66	2	1	0

Importance of Prompt Engineering

This exercise highlighted the importance of prompt engineering in guiding the LLM to prioritize specific tasks. By refining the prompt to emphasize refund requests and incorporating relevant keywords, the accuracy of categorization significantly improved, demonstrating how tailored prompts can enhance model performance. Adding specific keywords that the LLM should look for to categorize emails correctly has helped tremendously in achieving higher accuracy. Throughout the whole internship, prompt testing has shown that when giving specific examples of how the output should look like, the expected LLM output quality increased and became more consistent.

Decision to Use GPT-4o

After evaluating the classification performance and considering the higher costs, it was clear that the superior GPT-4o model was the preferred choice. The rationale was that the costs associated with manually correcting classification errors far exceeded the difference in costs between GPT-3.5 and GPT-4o.

Cost Calculations

The cost analysis for using OpenAI's API for the classification of 60 incoming emails per week is as follows:

Model	Week Cost (60 emails)
GPT-3.5 Turbo	$0.039
GPT-4o	$0.39

WashConnect opted to pay the premium for GPT-4o (*May 2024 pricing) due to its higher classification accuracy, which significantly reduces the need for manual intervention and ensures more reliable customer support operations. This investment in a more advanced model is justified by the substantial improvement in service quality and efficiency.

Email Drafting Step: Cases Excluding Refund Requests

For other cases, such as promo code issues, service feedback, and similar inquiries, it was estimated that approximately 20 emails are received per month. After calculating the costs for drafting responses to these emails—GPT-3.5 Turbo at $0.02 and GPT-4o at $0.20—the decision was again made to use GPT-4o. This choice was driven by the model's ability to generate responses that were more relevant and professional.

5. Project Timeline and Assessment

5.1. Proposed Timeline

The project was initially divided into three main phases:

1. **Exploration Phase (8 hours)**:

This phase involved identifying the optimal solution and presenting a prototype (VP) to WashConnect. It included assessing the current challenges, defining the scope of automation, and outlining the project plan.

2. **Implementation Phase (Estimated 7 hours)**:

This phase was expected to cover the development, integration, and testing of the final solution for WashConnect. The main tasks included setting up the automation workflows, integrating APIs, and ensuring seamless data flow.

3. **Training Phase (Estimated 2-4 hours)**:

The final phase involved training WashConnect employees, particularly Caroline, to use the automation effectively. The training sessions were planned to be conducted either online via videoconference or in person, based on WashConnect's preferences.

5.2. Actual Timeline

Due to unforeseen challenges and the need for extensive iterations, the project timeline extended beyond the initial estimates. Here is a detailed breakdown:

1. **Exploration Phase (8 hours - as expected):**

The exploration phase proceeded as expected, largely because the automation and GenAI software tools previously used in other projects closely aligned with the requirements for this specific project. Productive discussions with WashConnect were essential to ensure they fully understood the automation workflow and to secure their agreement to move forward.

2. **Implementation Phase (32 hours - 4x the expected duration)**:

This phase quadrupled in duration due to several key changes and adjustments.

- **Email Service Transition**: Transitioning from Microsoft Outlook's email service API to WashConnect's own server required significant adjustments and testing.
- **Parsing Method Adjustments**: Structuring the output of the LLM categorization step required refining the parsing methods to ensure accurate and reliable data extraction.
- **Data Flow Reorganization**: Reorganizing the data flow into Google Sheets took additional time, especially with the need to ensure consistency and reliability in data handling.
- **Customization of Google Sheets**: Customizing the Google Sheets to make it user-friendly and visually appealing for Caroline involved numerous small changes. Each modification in the

spreadsheet necessitated corresponding updates in the "Make[15]" automation to align with new variables and nomenclature.

3. **Training Phase (8 hours - 2-4x the expected duration)**:

This phase took twice the expected time due to the complexity of the automation and the need for thorough training.

- **Automation Functionality**: Extensive sessions were conducted to explain how the automation works and how to perform minor adjustments.
- **Continuous Feedback Loop**: There was significant back-and-forth communication between WashConnect and our team, including myself and Killian, to discuss adjustments and improvements. These discussions occurred concurrently with the training sessions to ensure that the automation met all user requirements.

The detailed timeline of events for this project is provided in appendix G for further reference.

5.3. Additional Details on tasks

Proposal redaction:

Additionally, after the exploration phase, a comprehensive proposal was drafted to outline the development plan and its rationale. The drafting of this proposal was primarily handled by Kilian. However, I played a significant role in revising the document and adding technical details, given my responsibility for developing the automation.

This revision process required an additional 5 hours of work, which were not accounted for in either the expected or actual timelines, as the bulk of this effort was undertaken by Kilian.

Email Service Transition:

During the automation project, an unplanned step involved transitioning from using Outlook to connecting with WashConnect's dedicated email server. Initially, the plan was to utilize Outlook, with emails stored on Microsoft's server, which would have required only a simple login and password for integration. However, after further discussions, it became clear that WashConnect preferred to use their own dedicated email server for greater control and security.

This transition required additional work, as connecting to an independent server is more complex. Specifically, all the Outlook modules in the Make automation platform had to be replaced with email modules configured for the dedicated server. This involved setting up the IMAP and SMTP connections with the provided server details and adjusting the variable transmission between modules. Due to connection issues and communication gaps, this process took longer than expected, requiring an additional 2-3 hours to complete. Nonetheless, this change was crucial for ensuring that WashConnect remained the custodian of their emails without relying on a third-party service.

[15] No-code automation platform https://www.make.com/

6. Results and Evaluation

6.1. Results and Benefits

This project led to significant productivity gains and cost savings for WashConnect. By automating key parts of the refund process and other email management tasks, the time Caroline spends on these activities has been drastically reduced.

Time and Productivity Gain:

Caroline previously took approximately 5 minutes to process each refund request. This included:

- Reading the email and categorizing it
- Entering details into the Spreadsheet
- Checking the CRM for refund eligibility (not automated)
- Creating a discount code in the CRM (not automated)
- Copying and adapting a refund confirmation email

Through automation, 3 minutes of human workload per refund email are now automated, leaving only 2 minutes for Caroline to handle the remaining tasks, including a 30-second verification of the spreadsheet entry. This automation saves 3 minutes per refund email, reducing Caroline's weekly workload from 3 hours and 20 minutes to just 1 hour and 20 minutes, effectively saving her 2 hours each week that can now be devoted to higher complexity tasks.

In addition, Caroline handles an average of 20 emails per week that are not refund requests. Previously, Caroline took an average of 4 minutes to respond to each of these emails. With the automation generating a summary in the Google sheet as well as a draft email that she only needs to review and adjust, this time has been reduced to 1 minute per email, saving her 4 minutes per email and totaling 1 hour and 20 minutes of saved time per week.

Task	Time Before Automation	Time After Automation
Refund Emails (40 per week)		
Reading and categorizing email	1 minute	Automated
Entering details in Spreadsheet	1 minute	Automated
Checking CRM for refund eligibility	1 minute	1 minute
Creating discount code in CRM	0.5 minutes	0.5 minutes
Copying and adapting confirmation email	0.5 minutes	Automated
Verification	0 minutes	0.5 minutes
Total Time per Refund Email	**5 minutes**	**2 minutes**
Weekly Time Spent on Refund Emails	**3 hours 20 minutes**	**1 hour 20 minutes**
Other Emails (5 per week)		
Responding to other relevant emails	4 minutes	1 minute
Total Time per Other Email	**4 minutes**	**1 minute**
Weekly Time Spent on Other Emails	**1 hour 20 minutes**	**20 minutes**
Total Weekly Time Spent on Emails	**4 hours 40 minutes**	**1 hour 40 minutes**
Total Weekly Time Saved		**3 hours**

By automating tasks, Caroline gains **3 hours per week**. Over a year (52 weeks), this results in:

Time Savings	Value
Hours Saved Annually	156 hours
Equivalent Days Saved	6 days 12 hours

This is almost equivalent to 4 weeks (40 hours/week) of work saved annually.

Financial Impact for WashConnect

Fixed Costs:

The initial development cost for this automation was incurred through the work of a junior developer. Assuming an hourly wage of **€30** and **48 hours** spent on the project, the fixed cost amounts to:

Description	**Cost**
Developer's Hourly Wage	€30/hour
Hours Spent on Project	48 hours
Total Fixed Cost	**€1,440**

Variable Costs:

The ongoing costs include fees for the OpenAI API and the Make Automation Platform. The details are as follows:

Service	**Weekly Cost**	**Monthly Cost**	**Annual Cost**
OpenAI API (GPT-4o)	$0.59	$2.57	$30.84
Make Automation Platform	-	$10.00	$120.00
Total Variable Costs (USD)	**$0.59/week**	**$12.57/month**	**$150.84/year**
Total Variable Costs (EUR)	**€0.54/week**	**€11.37/month**	**€136.74/year**

Benefits:

Given that a customer service employee's gross hourly wage is estimated at **€25/hour**, the automation saves the company:

Time Period	**Savings (€)**
Weekly	€75
Monthly	€326.78
Annually	€3,921.30

Five-Year Financial Projection

Over a five-year period, the financial impact considering both fixed and variable costs is calculated as follows:

Description	Amount (€)
Total Savings Over 5 Years	€19,606.50
Fixed Costs	-€1,440.00
Variable Costs Over 5 Years	-€683.70
Net Gain Over 5 Years	**€17,482.80**

Over a five-year horizon, the automation not only saves **32.5 days** of customer service work but also provides a net financial gain of **€17,482.80 (3,496.56€/year)**. This represents a significant opportunity cost for companies that do not adopt automation and generative AI technologies.

When considering a longer time horizon, the fixed costs, such as the development of automation, can shrink significantly as they are spread over a more extended period. This highlights the substantial productivity and financial gains that can be achieved by companies that choose to adopt AI automations early. By investing in these technologies sooner, businesses can maximize their returns over time, making early adoption a strategic advantage.

6.2. Project Evaluation and Reflection

This project served as a significant learning experience, allowing me to take on the role of the primary contributor with minimal supervision from Gabriel. The process involved managing both technical and client-facing aspects, providing valuable insights into project management and client communication.

Key takeaways:

- **Primary Contributor:** I led the development and implementation of the automation, with almost no direct oversight from Gabriel, allowing for autonomy and growth in managing a real-world project.
- **Time Management and Efficiency**: The automation effectively reduced the manual workload, directly translating into time savings and increased productivity for the client.
- **Client Communication:** The project underscored the importance of clear and consistent communication with the client to avoid misunderstandings and ensure project alignment with client needs.
- **Technical Challenges:** While the automation process was successful, challenges such as adapting to an independent email server and researching API documentation highlighted areas for improvement in technical proficiency and adaptability.

This project not only contributed to my growth as a business engineer but also provided practical insights into balancing client needs with technical execution, ultimately bridging the gap between non-

technical clients and technical solutions. These experiences will be invaluable in addressing future challenges and refining my approach to similar projects.

7. Conclusion

This project provides a compelling example of how a generative AI-powered automation can improve sales processes in small businesses. The customer service emailing automation developed for WashConnect demonstrated clear benefits in streamlining operations and increasing productivity. By automating routine tasks such as categorizing incoming emails and generating responses, the project significantly reduced the time Caroline spent on these activities. This ultimately contributes to improved customer service and satisfaction—a key aspect of enhancing sales operations.

The project also highlighted the essential role of human problem-solving and creativity in developing and implementing automation solutions. While generative AI was instrumental in drafting automatic emails in three languages and refining prompts to ensure consistent and accurate output, the overall design and development required human expertise. For instance, the prompts used for GPT-4o were carefully crafted to ensure that the AI could categorize emails accurately and extract detailed data points, such as category, summary, language, customer details, and refund information, all formatted in JSON. This level of detail was critical to the success of the automation, as it ensured that the system operated efficiently and effectively.

Another key aspect of the project was the management of AI hallucinations, particularly in cases where incoming emails were vague or poorly written. To mitigate this, the prompt engineering process included specific instructions and keywords that prioritized accurate categorization of refund requests—WashConnect's most critical email category. Ensuring that refund requests were correctly identified was essential, as misclassification could lead to unresolved cases and dissatisfied customers. By focusing on minimizing false positives in this category, the automation maintained high levels of accuracy and reliability.

Moreover, the project illustrated the decreasing costs associated with LLM API requests, making such technologies increasingly accessible for SMEs. Over the span of just 15 months, the cost of using GPT-4 decreased by nine times (March 2023 to May 2024, GPT-4 to GPT-4o), with further reductions introduced with models like GPT-4o-mini (July 2024, 25-30x cheaper than GPT-4o) which excels at specific tasks. This trend suggests that generative AI will become even more feasible for small businesses to implement in their sales, marketing, and operational processes, offering substantial benefits without prohibitive costs.

Additionally, the project demonstrated the importance of maintaining a human verification step within the automation process. By implementing a confirmation button in Google Sheets, the system allowed Caroline to manually approve or reject refund requests with just a single click. This feature not only centralized all relevant information but also streamlined the verification process, ensuring that human oversight remained a key component of the system.

In conclusion, this project serves as a strong example of how generative AI-powered automation can significantly enhance small business sales operations. It not only demonstrates the potential of AI to streamline processes and reduce workloads but also underscores the importance of maintaining a balance between automation and human intervention. Notably, the automation saved Caroline 156 hours annually, equivalent to nearly a week of work, and provided a net financial gain of €3,496.56 per

year. As generative AI technologies continue to evolve and become more cost-effective, they offer exciting opportunities for SMEs to optimize their operations and drive growth. This project is a testament to the transformative power of AI in small business environments and provides valuable insights for other companies considering similar implementations.

Part 7: Assessment and Outlook for Projects

1. Experience Within the Company and Team Dynamics

My experience at GMCOLAB was characterized by immersion in various technical and strategic projects, a high degree of autonomy, and some organizational challenges. Gabriel, as my internship supervisor and CEO, provided me with significant freedom to explore and develop solutions based on generative AI. This autonomy greatly facilitated my learning process, enabling me to acquire new technical skills and gain a better understanding of the needs of a growing small business, as well as the technical processes underpinning the benefits of AI implementation in SMEs.

However, this autonomy sometimes came with a lack of clarity regarding priorities and deadlines. The team dynamics, primarily involving Gabriel, Killian, and myself, were generally positive, with open and direct communication maintained through almost daily video calls. Nevertheless, the management of daily tasks was occasionally disrupted by demands for additional tasks, such as administrative or support duties, which sometimes diverted our attention from the main projects. Better structuring and clearer prioritization of tasks would have likely led to increased efficiency. Emphasizing the necessity of certain tasks to achieve broader objectives could have helped maintain motivation, and more frequent communication about the vision and various goals at a higher, "meta" level might have allowed us to better contextualize and manage our expectations.

I also believe that this is partly due to the fact that Gabriel is used to working with collaborators like Andrew, with whom he has been working for nearly four years, and the other team members, who have decades of industry experience. Their ability to implicitly understand the framework or ask questions to clarify important points is something that we, as interns, may not yet fully possess.

2. Feedback for Gabriel as Internship Supervisor and CEO

Gabriel was a committed mentor, taking the time to explain not only the tasks to be completed but also their connection to GMCOLAB's overall strategy. His direct and transparent approach made it easier for me to understand the stakes involved and kept me motivated throughout my internship. I particularly appreciated his ability to link the projects I was working on to broader strategic objectives, thereby enhancing the relevance of my work.

However, there are areas for improvement that I would like to highlight. First, project planning could be more rigorous, with more precise deadlines and better-defined priorities. The lack of clarity in time management sometimes led to inefficiencies, particularly when urgent but less strategically important tasks took precedence over more critical projects.

Additionally, Gabriel could benefit from delegating more, especially in terms of administrative tasks or those with low added value. Hiring a dedicated assistant would allow Gabriel to focus on more strategic aspects, increasing his capacity to lead the company and effectively manage a growing clientele. There is also a need for a second manager, particularly someone proficient in Dutch, to manage relationships with Flemish clients, which would help distribute the workload better and improve the company's

responsiveness. Gabriel himself would gain from delegating, not only to save time but also to remain focused on what he does best, such as business strategy.

3. Impact of Completed Projects

While my work in research and development on automations integrating generative AI was beneficial, it is important to note that several projects did not yield tangible results for GMCOLAB. For example, the development of the Python script for LinkedIn data extraction, although technically interesting, was rarely used. The time invested in this project was not justified by the added value it brought, partly due to a lack of communication during periods when Gabriel was particularly busy.

Regarding other projects, such as the development of a landing page, it is important to note that these initiatives were not included in my thesis as they did not fit the thematic framework. However, it is relevant to mention them here to illustrate some of the challenges encountered. In the case of the landing page, it was intended to encourage sign-ups for GMCOLAB seminars. The initial choice to develop it on MailerLite resulted in considerable time loss. Clearer communication with Gabriel could have quickly steered us toward a more appropriate solution, such as using WordPress, already employed by the company at a modest cost to create web pages. However, these initiatives had indirect benefits, such as experimenting with various tools to assess their potential or creating mockups that were later used as drafts by developers. For instance, the landing page we created, with the text and layout, was reused by the developer during its actual implementation.

Another significant project was the development of a user interface for transcription. This tool was widely used to transcribe meetings or voice notes, effectively structuring and summarizing the ideas discussed. These summaries, which Gabriel quickly sent to his clients, were highly appreciated, reinforcing client satisfaction. This work also led to further development by Andrew, and today, the transcription and summarization software is marketed by GMCOLAB to professionals.

My work on seminars and workshops was also very beneficial for GMCOLAB, not only from a financial perspective but also in terms of acquiring new clients. These seminars are an integral part of GMCOLAB's marketing and commercial strategy. The research required to propose relevant and engaging practical cases during these sessions was significant but contributed greatly to the success of these events.

Finally, I had direct responsibility toward clients, notably with the development of a finished product for WashConnect, which is used weekly by Caroline. This product helped save time and improve the efficiency of internal processes. Additionally, I developed prompts for some GMCOLAB clients, assisting them in accelerating content creation on social media as well as customer service.

Unfortunately, I was not as close to Andrew, GMCOLAB's lead developer, as I would have liked. Andrew, with his 17 years of development experience, could have helped me solve technical problems more quickly and could have played a role as a secondary internship supervisor, focusing more on technological and development aspects. The lack of interaction with Andrew was sometimes limiting, as I could have benefited from his expertise to progress more quickly in my projects. Andrew was mainly responsible for developing finished products, while I, as an intern, focused on the exploratory phase, researching tools and software to test the viability of new GMCOLAB activities. Closer collaboration with him would have certainly enriched my experience and accelerated my learning.

However, his time was too valuable for the company, and the time Gabriel dedicated to us was already relatively substantial.

4. Challenges and Recommendations

Working remotely presented challenges, particularly in terms of communication and collaboration. Although we maintained almost daily meetings to discuss project progress, the absence of in-person work sometimes limited the effectiveness of our exchanges, the speed of problem resolution, and motivation. This is not a direct criticism of Gabriel, given that I was aware of the circumstances: he works from home, his employees are also remote, and he was going through a particularly busy period due to personal circumstances. However, it is worth noting that for "junior" profiles like interns, an onboarding phase is necessary to learn how to communicate effectively.

Another major challenge was the lack of a well-established delegation process, which sometimes led to bottlenecks. Gabriel could significantly increase GMCOLAB's capacity to deliver high-quality work to more clients by hiring an assistant. This step is all the more justified as the demand for GMCOLAB's services is growing. Hiring an assistant to handle administrative tasks and those of lesser strategic importance would not only improve internal efficiency but also free up Gabriel to focus on strategic development and managing high-value projects. This would require not only hiring a highly qualified individual but also establishing SOPs (Standard Operating Procedures) within the company, especially if there is a plan for significant long-term growth.

My internship at GMCOLAB was a rich and formative experience. The challenges I encountered allowed me to develop practical skills in project management and technological development while highlighting the importance of clear communication and rigorous planning in a dynamic and constantly evolving work environment.

5. Summary of Project Outcomes

The integration of generative AI-powered automations in GMCOLAB projects delivered significant benefits across various initiatives, enhancing both sales operations and overall business efficiency.

Lead Generation and Customer Segmentation on LinkedIn

- **Cost Savings:** The project significantly reduced advertising costs by enriching LinkedIn profile data, leading to more cost-effective targeted ads.
- **Time Efficiency:** Automated segmentation and personalized outreach processes accelerated lead generation, contributing to more effective targeting and client engagement.
- **Strategic Impact:** The segmentation of Gabriel’s LinkedIn network provided valuable insights into profitable client groups, allowing for more targeted marketing strategies.

Customer Service Emailing Automation

- **Time Savings:** The automation will save Caroline 156 hours annually, equivalent to almost 4 weeks of work.
- **Financial Impact:** This initiative will result in a net annual financial gain of €3,496.56 for WashConnect.

- **Operational Improvement:** Automating routine tasks led to faster and more accurate customer service responses, improving customer satisfaction. A manual verification step was included to ensure critical tasks, like refund processing, were handled accurately.

Content Repurposing

- **Revenue Generation:** The seminars and consultations linked to the content repurposing initiative generated €9,640 in revenue from 147 hours of work, with an average revenue of €43.75 per hour.
- **Project Distinction:** While the seminars and workshops were financially successful, other sub-projects like the newsletter and podcast automations, which were still at the MVP stage, did not directly materialize in sales or financial outcomes. However, these efforts can lay the groundwork for future developments that could enhance content creation and distribution efficiency.
- **Marketing and Community Building:** Despite the automations not being fully completed, the MVPs showed significant promise in automating content creation, which played a key role in building a community and enhancing engagement with potential clients.

Part 8: Recommendations: Lessons Learned and Practical Tips for Integrating AI-Powered Automations in SMEs

Integrating AI-powered automations into an SME can significantly enhance operational efficiency, service quality, and even customer experience. However, to maximize the benefits of these technologies while minimizing risks, it is essential to follow a structured and well-planned approach. Based on the lessons learned from implementing AI solutions at GMCOLAB, here are some recommendations applicable to all SMEs:

1. Start Small: Focus on Simple, Scalable Automations

When SMEs begin exploring AI-powered automations, it's crucial to start small and focus on simple, manageable tasks that fit within their current resources. Instead of jumping into complex automations that require extensive coding and development, it’s more practical to begin by automating repetitive tasks that are straightforward and can be easily implemented using no-code platforms. This approach allows SMEs to see immediate benefits without overcommitting resources.

Starting with small, manageable automations helps avoid the pitfalls of over-investing in projects that may become irrelevant due to shifts in company strategy or changes in needs. It's easy to get carried away with the possibilities of automation, but by beginning with simple tasks and gradually building up, companies can avoid wasting resources on projects that might not pay off. For more complex automations, it’s wise to break them down into modular components that can be reused in other areas if needs change. This way, even if a project is no longer relevant, the work put into it can still provide value in other contexts.

2. Choosing Between External Tools and In-House Development

SMEs often face the decision between using ready-made generative AI solutions or developing custom tools in-house. “No Code” or “Low Code” platforms provide initial flexibility, making them ideal for rapid testing and frequent adjustments. On the other hand, developing a solution from scratch offers complete ownership and greater long-term flexibility. However, if a viable solution is already available on the market, even if it comes with significant financial costs, it might be a more practical choice than building the software in-house.

3. Investing in Training and Skill Development

Adopting generative AI often requires new skills within the team, making it crucial to plan appropriate training sessions for employees. This ensures they can not only use the new technologies but also understand their potential and limitations. Additionally, it’s important for the company to assess the current workforce's ability to effectively implement the AI strategy. If internal talent or resources are insufficient, actively seeking external experts or consulting firms might be necessary. These external resources can provide the right guidance and information, ensuring the company is effectively positioned to achieve its AI development strategy.

4. Establishing Standards and Procedures (SOPs)

In a small company, where the environment is highly dynamic and tasks are often handled by different employees, establishing clear and detailed SOPs is crucial. These SOPs should outline step-by-step instructions for various tasks, ensuring that all employees can perform them efficiently without needing excessive communication or clarification. For example, if multiple employees are responsible for client onboarding or managing customer inquiries, a well-documented SOP will allow any team member to handle these processes seamlessly, reducing the risk of errors and saving valuable time.

Moreover, SOPs are particularly valuable when employees leave the company, as they provide a structured guide for new hires. This minimizes the need for extensive training and explanation, allowing the new employee to quickly adapt to their role and maintain operational continuity. By having SOPs in place, the company can ensure that key processes are consistently followed, regardless of who is performing them, thus enhancing efficiency and stability in the business operations.

5. Anticipating Technological Evolutions

Enterprise culture plays a crucial role in the successful integration and ongoing adaptation to new technologies. For a company to not only implement new technology effectively but also to continuously evolve with technological advancements, fostering a culture that embraces change and innovation is essential. This involves cultivating an environment where employees are encouraged to stay informed about emerging trends, participate in ongoing learning, and be proactive in experimenting with new tools and methods.

A company that nurtures this culture will not just implement AI once but will develop the agility to "surf the wave" of technological evolution, constantly adapting its strategies and processes to leverage the latest innovations.

6. Balancing Automation with Human Oversight

As AI technology rapidly advances, it's essential to recognize that many tasks and human abilities still far surpass what AI can achieve. This understanding should guide decisions about which tasks to

automate and which should remain under human control. While automation can greatly enhance efficiency, it's crucial to prioritize which tasks are automated, focusing first on those that offer the greatest efficiency gains without compromising the core values or unique vision of the company.

Certain aspects of a business—such as tasks closely tied to company values, customer relationships, or creative processes—may be better left unautomated to preserve the personal touch and strategic vision that define the brand. Furthermore, when choosing to automate, it's important to assess the extent of automation carefully. This involves not only considering the current technological capabilities but also weighing the potential risks of over-automation.

Over-automating can lead to structural risks, such as errors that may prove costly, or scenarios where AI-generated outputs—such as those from generative models—diverge significantly from expectations, potentially leading to customer dissatisfaction. Issues like AI hallucinations or the misapplication of automation can result in serious consequences for the business. Therefore, it's critical to implement a balanced approach, where automation is used to enhance operations while maintaining necessary human oversight to ensure quality, consistency, and alignment with the company's mission and values.

7. Learning from Success Stories

It's important to recognize that there are companies, particularly those that are already dynamic and possess a wealth of talent, which can navigate and implement highly innovative solutions with ease. These companies are often at the forefront of technological evolution and may benefit from a more nuanced and dynamic approach in their AI integration process.

However, for the majority of SMEs that are just beginning their journey into AI implementation, learning from success stories and adopting proven strategies can be immensely beneficial. By studying what has worked well for other companies, these SMEs can avoid common pitfalls and streamline their own integration process. For these businesses, leveraging existing knowledge and best practices can provide a solid foundation for building their own AI capabilities. Conversely, those with the ability to innovate at the cutting edge may choose to tailor their strategies more dynamically, forging new paths rather than following established ones.

8. Thinking about the Long Term Gain, not the Present Cost

When considering the adoption of generative AI-powered automations, companies should focus on the long-term benefits rather than being deterred by the initial financial costs. While the upfront investment in building out these automations can be significant, it's crucial to take a broader view of how these technologies will enhance productivity and save time over the long run. Automations can drastically improve efficiency, reduce repetitive tasks, and free up employees to focus on higher-value work, leading to substantial gains in overall business performance.

By adopting a long-term perspective, companies can better assess the true value of AI-powered automation, understanding that the initial cost is an investment in future productivity and competitiveness. This approach ensures that the decision to automate is made with a strategic mindset, prioritizing sustained growth and efficiency rather than being limited by the immediate expense.

Conclusion

The integration of generative AI-powered automations into small business sales operations, as explored through the case study at GMCOLAB, reveals significant insights into the potential and challenges of this emerging technology. This conclusion synthesizes the findings from the literature review, practical projects at GMCOLAB, and reflective insights from our internship to provide a comprehensive answer to the research question: **How can generative AI-powered automations enhance small business sales operations?**

1. Generative AI's Role in Enhancing Sales Operations

The literature review shed light on the transformative potential of generative AI across various business domains, particularly in marketing and sales. Kanbach et al. (2023) emphasized the democratization of technology through tools like ChatGPT and DALL-E, which lower barriers to content creation and allow even small businesses to generate high-quality outputs at scale. This is crucial for SMEs like GMCOLAB, which can leverage these tools to enhance their marketing and sales operations, achieving greater customer engagement and operational efficiency.

In the practical projects at GMCOLAB, generative AI was instrumental in automating and optimizing sales-related processes. For instance, the Lead Generation and Customer Segmentation on LinkedIn project demonstrated how generative AI can streamline lead identification and client outreach, resulting in significant cost savings and improved targeting of potential customers. Thanks to increasingly capable large language models, GMCOLAB was able to achieve classification without pre-existing datasets and even generate datasets on demand. This capability significantly shifts the landscape, as classification enables a wide range of possibilities. Moreover, the advancements in natural language processing allow for the handling of unstandardized data, representing a significant evolution in the field. By automating the segmentation of LinkedIn connections and personalizing outreach messages, GMCOLAB was able to engage with a broader and more relevant audience, thereby enhancing the efficiency of its sales efforts.

Similarly, the **Customer Service Emailing Automation** project illustrated the practical benefits of AI in reducing workload and improving customer service. Automating email responses and categorization enabled WashConnect to manage customer inquiries more efficiently, directly contributing to better customer satisfaction and, by extension, more effective sales operations. During the model selection for the GenAI-powered email automation project, the reduction in GPT-4 (4 & 4o) API costs over 15 months was highlighted. This trend underscores the increasing accessibility of these technologies for SMEs (Townsend, 2023).

These practical examples align with the broader literature, which supports the use of AI in optimizing repetitive and data-driven tasks. Bi (2023) and Townsend (2023) both highlight that generative AI excels in areas such as content creation and customer engagement, making it a valuable tool for SMEs looking to enhance their sales processes. However, it is also crucial to recognize the balance required between AI automation and human oversight, particularly in tasks that involve complex decision-making or require a deep understanding of customer needs. Therefore, internal expertise and experience are vital for the effective implementation of AI, or alternatively, the need for external consultancy becomes essential, as improper implementation can be risky.

2. Balancing AI Automation with Human Expertise

The literature and practical experiences at GMCOLAB both emphasize the importance of balancing AI automation with human creativity and decision-making. Mukherjee and Chang (2023) discuss the novelty-usefulness tradeoff in AI, cautioning against over-reliance on AI-generated content, which can lead to homogenization and a loss of creative and critical thinking. This concern was echoed in the GMCOLAB projects, where human oversight remained essential, particularly in the content repurposing initiatives.

For example, in the **Content Repurposing** project, human involvement was critical in ensuring the quality and relevance of the AI-generated content. The process of converting blog posts into newsletters or podcasts required careful prompt engineering and human verification to maintain the quality and engagement of the output, as substandard content can be more detrimental than the absence of content altogether. This underscores the findings of Santhosh et al. (2023), who argue that while AI can automate repetitive tasks, human expertise is irreplaceable in more nuanced areas, such as creative content development and strategic decision-making.

3. Addressing Ethical and Practical Challenges

The practical application of generative AI in GMCOLAB's projects also highlighted the ethical and operational challenges that SMEs must navigate. The literature review discusses the risks associated with AI, including hallucinations and over-reliance on automated systems, which can lead to significant operational and reputational damage if not properly managed (Roychowdhury, 2024; Candelon et al., 2023). These concerns were directly addressed in the GMCOLAB projects through careful management of AI-generated outputs and the retention of human oversight in critical stages of the automation process.

The projects at GMCOLAB reinforce the need for SMEs to be cautious in how they implement generative AI. The potential for AI to erode creativity and critical thinking, particularly in smaller businesses where resources for oversight are limited, is a significant concern. The projects at GMCOLAB, such as the **Customer Service Emailing Automation**, demonstrated the importance of maintaining a human role in supervising AI outputs, ensuring that automated processes align with the company's values and customer expectations.

Furthermore, the ethical considerations surrounding AI use, such as data privacy and the potential for job displacement, were acknowledged but not fully explored in the GMCOLAB projects. However, the literature provides a framework for addressing these issues, emphasizing the need for responsible AI integration that balances technological innovation with ethical business practices (Apotheker et al., 2023).

4. Practical Insights for SMEs

The case study at GMCOLAB provides valuable practical insights for other SMEs considering the integration of generative AI into their sales operations. The successful implementation of AI-powered automations in GMCOLAB's projects demonstrates that even with limited resources, SMEs can leverage generative AI to achieve significant improvements in efficiency, customer engagement, and sales outcomes.

However, the projects also underscore the importance of a strategic approach to AI integration. Generative AI, at its core, functions as a sophisticated prediction engine. The current advancements

in AI are driven by a combination of increasingly rich data, advanced techniques for data creation and training, and the continuous refinement of AI models and mechanisms, such as AI agents. Additionally, the substantial investments and interests from those working in AI development suggest that we can expect ongoing structural improvements in these technologies.

This trajectory indicates that the boundary between what AI can achieve and what can be practically implemented will continue to expand. Therefore, it is crucial for SMEs to start their AI implementation journeys as early as possible. Delaying this adaptation could result in significant challenges, as companies that fail to build momentum may find themselves facing a steep technological barrier in the future.

The experience at GMCOLAB illustrates that confronting technical challenges early on not only equips businesses to adapt to rapid technological evolution but also positions them to benefit more from future advancements. SMEs that initiate AI integration sooner will be better prepared to navigate and capitalize on the iterative improvements that are reshaping the technological landscape.

In conclusion, generative AI-powered automations can significantly enhance small business sales operations by streamlining repetitive tasks, improving customer engagement, and enabling more targeted and efficient marketing efforts. However, to fully realize these benefits, SMEs must balance automation with human expertise, carefully manage the risks associated with AI, and adopt a strategic approach to integrating these technologies into their business processes. Importantly, they must also recognize that the frontier of AI capabilities is rapidly advancing, making it essential to engage with these technologies now to avoid being left behind as the pace of innovation accelerates.

Finally, the integration of AI not only enhances customer engagement and service quality but also allows employees to focus on higher-level, more fulfilling tasks. Effective communication about the benefits of AI for employees themselves is crucial to avoid managerial resistance and to ensure a smooth adoption process. By framing AI as a tool that empowers rather than replaces, SMEs can foster a more supportive and innovative environment, paving the way for sustained growth and success in an increasingly AI-driven landscape.

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