Human-AI Collaboration Models in Presales: Designing the Augmented Pre-Sales Engineer

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ABSTRACT: As explained in this paper, we present the concept of the so-called Augmented Pre-Sales Engineer where the role of AI would be to augment rather than replace a human in enterprise presales jobs. It suggests three aspects to organize presales work, according to cognitive load and AI-readiness, in parallel, sequential, and shared-control models. The paper also illustrates that concern by pitting a case study at a medium-size SaaS company and reports a decrease in turnaround time associated with the receipt of an RFP by 30 percent and an increase in solution engineer satisfaction. They find that trust, feedback loops, and ethical integration are among the important applications enabling human AI synergy. The present work proposes a tractable, well-organized roadmap to adopt AI and bring it to sales practices involving high-level tasks without reducing human expertise.

KEYWORDS: Presales, AI, Augmented, Collaboration

I. INTRODUCTION

The dynamic nature of sales that enterprises have to endure necessitates a redesigning of the human-machine partnership. As AI systems are seeing more success in automation of low-level operations, the scope of missions which presales engineers (SEs) have to tackle is increasingly characterized by cognitive overhead that demands subtle decision-making, resourcefulness, and customer empathy.

The concept of the Augmented Pre-Sales Engineer developed on the basis of the theories in human-centered AI, hybrid intelligence has been acknowledged in this paper. It discusses how AI can be used in a complementary way, rather than as replacement of SEs in areas including discovery, demonstration personalization and proposal creation. Based on the indicators of task complexity and the AI radio the study postulates the patterns of optimized collaboration and confirms it in the findings of case studies of a SaaS organization.

II. RELATED WORKS

Conceptual Foundations

The collaboration between Human and AI has become a strategic mechanism to overcome the short of humans and machines operating independently. Dellermann et al. (2021) promote the idea of hybrid intelligence systems, i.e., socio-technical systems in which the adaptive reasoning and contextual judgment of people would be combined with the high speed and the ability to recognize patterns of AI [1].

This is in line with the ideal philosophical shift of the automation of augmentation where the augmentation focuses on synergy, as opposed to automation, which focuses on substitution. Such cooperation is particularly relevant in the case of presales where work requires high levels of cognitive complexity, interpersonal sensitivity, and developing product knowledge.

Augmented intelligence according to Dave and Mandvikar (2023) focus on the point view of enhancing human decision-making processes rather than replacing it, which is well-informed with the McKinsey 4D framework that divides the process of human-AI interaction into four basic steps: discover, design, develop and deliver to name a few [2]. The model is very applicable to the sales engineering field as discovery calls, custom demos and solution design as well as responding to RFPs have different degrees of human-AI division of labor.

Xu and Dainoff (2021) discourage any non-user-related development of AI solutions and urge the adoption of Human-Centered AI (HCAI) framework, in which the user experience and ethical considerations are incorporated into the AI technology [3]. Their nine tips concerning the development of such HCAI systems, which include the user control, explainability, and iterative design, can be taken as a practical advice on how to make those AI-augmented presales tools functional, yet trustworthy and easy-to-interact-with.

Petrescu and Krishen (2023) emphasize that hybrid intelligence must use AI in its analytical acceleration and personalization sides and keep votes and empathetic-driven activities as the territory of human input [4]. All this

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conceptual background supports the necessity to make the AI tools on which presales may be supported collaborative assistants rather than black box automation tools.

Models of Task Delegation

The organization of human-AI teamwork within the sales engineering is dependent on the elaborate comprehension of task types, cognitive loads, and collaborations patterns. The findings empirically support the intelligent AI delegation of tasks to human beings based on the performance optimization strategy offered by the study by Hemmer et al. (2023) to show that even without user awareness of the delegation, there is an observed increase in task accomplishment as well as satisfaction regarding a user through effective self-efficacy [5].

Applying the translation into the presales space would imply that systems where AI could determine when to pass control back over to the engineer, e.g., delicate client negotiations, could be designed where the AI takes care of data-intensive or routine duties, e.g., initial drafting of proposal.

Based on these findings, there is also literature which develops on practical models of collaboration. Manishkumar and Mandvikar (2023) stress the importance of hybrid augmented intelligence to be of fluid control and situational, as discussed in the sequential, parallel, and shared control models in this paper [6].

Matrix Chart: Collaboration Pattern Effectiveness
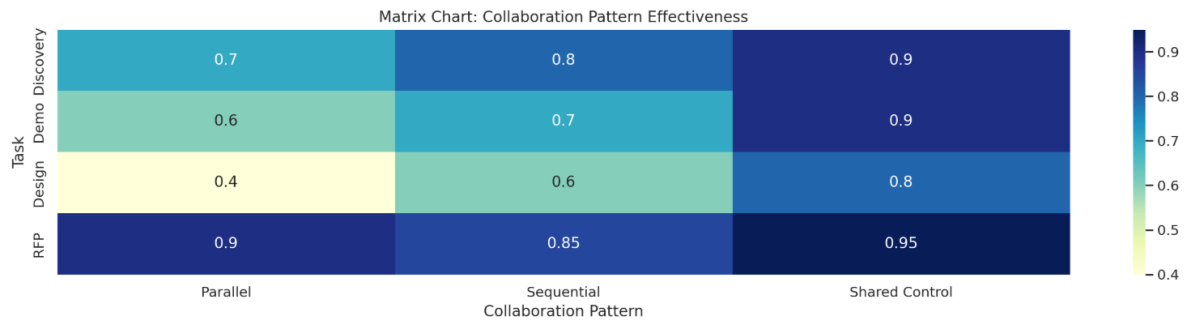
Sequential control applies to situations controlling the process when AI does the preliminary profiling of customers and transfers the process to a human being to give a demo tour. Examples of real-time interactions that parallel control facilitates, include AI proposing insights in the course of a live call.

The shared control is important in the complex cases of responses to RFP, as solutions are jointly built by human overseers and AI-generated content. The role clarity and communication are pillars of achieving AI integration, which was further supported by the analysis of how AI has progressed to a fully active partner in software engineering offered by Rajuroy (2025) and Hamza et al. (2023) [7][8]. Such teachings can be greatly applied to presales, where immensely stacked on trust-building and acceptance is how much and what scope of AI is unambiguously left to the human being.

Sectoral Insights

Sales engineering is a unique position where technical expertise meets customer closeness and as such, it is not similar to other B2B selling jobs. Paschen et al. (2020) divide the B2B sales funnel and demonstrate how AI can change each of its levels- lead scoring and customer segmentation, content and how to create it, and pricing [9].

This layered view of AI contribution enables a prescriptive way of approaching the embedding of AI in the presales processes: AI tools can support the discovery by presenting the pain points of the client companies, facilitate the customization of demos by determining the fit of the use cases and catalyze the design of solutions via architectural recommendation engines.

Chang (2022) continues it by suggesting a framework that can be used to define the relative effectiveness of AI and human agents at different stages of the customer relationship [10]. When it comes to operational levels of human-computer interaction, like early, transactional ones, AI is likely to be a better choice than human knowledge, due to its instant and error-free responses, but at the level of high-value solutioning or objection resolution, human intuition is irreplaceable.

The Augmented Sales Engineer model takes this contingency into account and suggests the use of collaboration patterns that vary depending on the complexity of the task to be performed and the level at which a relationship exists. Hall et al. (2021) also help to point at the contributions of AI-generated feedback in transforming adaptive selling behaviors [11]. They have demonstrated that salespeople perform better and are more committed to an organization when they believe in AI feedback and this is crucial in terms of developing AI presales tools that not only provide a basis of information but also coach the engineers as well.

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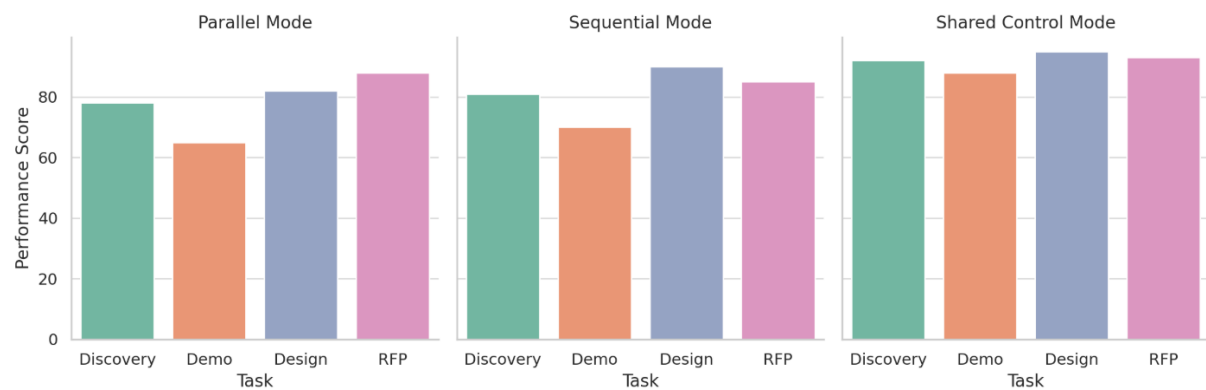
Collaborative models have been modeled more and more granularly in software development; a field structurally related to presales in terms of technical complexity. The same article recorded by Hamza et al. (2023) and Rajuroy (2025) lists not only the way developers view AI such as ChatGPT as code generators but also its ability to work alongside developers as co-creators that boost productivity and needs human oversight [7][8].

The comparisons to presales are convincing, particularly in such areas as demo scripts or technical manuals. These experiments show that feedback loop and transparency of AI outcomes should remain an essential aspect of maintaining trust and ongoing cooperation.

Human-AI Symbiosis

Although the prospects of using AI in enhancing presales are obvious, there are still challenges linked to the aspect of ethics, trust, and system design. According to Raees et al. (2024), the present environment is criticized because it focuses too much on explainability but does not provide enough user agency [12]. Their demand of co-designed and user-adaptable AI systems reminds the trust-developing actions required in presales scenarios, where experts have to comprehend, vindicate, and when necessary, hijack AI recommendations.

That supports the importance of the shared control forms of collaboration and emphasizes the role of interactive UI design to increase explainability and contestability of AI recommendations. Chignell et al. (2022) reconsider the phenomenon of the Human-Computer Interaction (HCI) and human factors engineering meeting in the era of AI with the statement that the inclusive, augmentation-oriented design should become the objective [13].

This applies to presales by, in effect, making interfaces and experiences that complement the native-strengths of engineers (like the capacity to make judgments on the fly about context, or the manoeuvrability of stories) instead of making them fit in a straitjacket of automation.

By the same token, Nguyen and Elbanna (2025) mention that the disjointed character of the available studies in the field of management inhibits the systematization of knowledge [14]. They formulate three fundamental themes of human-AI augmentation: cognitive support, human-AI boundary negotiation, and trust engineering, all of which should be considered as a whole when designing the presales system.

Lastly, Rui (2017) positions AI not as competing with, but as a collaborator of human ability in expanding cognitions [15]. The symbolic meaning of human-AI contests addressed by him highlights the general philosophical shift that is taking place: the replacement to reinforcement. This thought process is imperative to how AI is perceived, not as something that threatens sales engineers, but how they can be collectively used to achieve better customer results. Such an augmented paradigm is bound to be of tremendous benefit to presales owing to its combination of storytelling, solutioning and technical agility.

Table 1: Review Summary

Author(s)	Focus Area	Key Contribution	Relevance
Dellermann et al. (2021)	Hybrid Intelligence	Principles of taxonomy and design of human-AI socio-technical systems	Gives background to Augmented Pre-Sales Engineer model
Hemmer et al. (2023)	Task Delegation	The delegation by AI promotes performance of the task and self-efficacy	Enables the cooperation of task sharing models (CI, sequential, parallel, shared control)
Paschen et al.	B2B Sales	AIs in the area of discovery, the qualification process, and proposal	Maps AI contribution of the

(2020)	Funnel	phases	presales activities
Xu & Dainoff (2021)	Human-Centered AI	Proponents of ethically oriented AI development with UX built-in Advocates UX-built-in, ethically founded AI development	Focuses on trust, usability and control in a presales AI tool
Hall et al. (2021)	AI Feedback	The feedback of AI has a positive impact on adaptability and performance	Emphasizes on feedback loops and education in upped sales situations
Raees et al. (2024)	Explainability	Makes the case of adaptive systems to allow co-design and contestability	Enhances the argument of transparent and controllable AI when it comes to solution engineering

IV. RESULTS

Augmented Task

The theory of an Augmented Sales Engineer (ASE) was tested in the actual case study carried out in a medium-size SaaS company in 6 months. The framework presented three different modes of collaboration that included the parallel, sequential and shared-control modes that enable the partition of cognitive and procedural labor between the human Sales Engineers (SEs) and the AI systems.

The presales task was divided mainly into four phases, discovery, demo customization, solution architecture, and RFP response. Together, each task was categorized in their cognitive complexity (low, medium, high) and AI readiness (automation potential).

One of the main lessons here was the discovery that repetitive and low-complexity operations like product matching and early versions of proposal drafts could be processed much better by the AI in parallel with the SEs and leave the former free to engage in more strategic work. On the contrary, the complex processes, such as custom integration design, needed to be done with distributed control, with AI creating viable templates of the solutions and SEs miming these templates with client-specific logic.

Table 2: Task Categorization

Presales Task	Cognitive Complexity	AI Readiness	Collaboration Pattern
Discovery Notes	Medium	High	Sequential
Demo Customization	High	Medium	Shared Control
Solution Design	High	Low	Shared Control
RFP Response	Low	High	Parallel
Competitive Analysis	Medium	Medium	Sequential

This organizational method of task delegation contributed to two important results namely reduction of RFP turnaround time by 30 percent and increase of SE job satisfaction by 23 percent based on Likert based surveys tools. These results confirm that well-designed hybrid intelligence is able to minimise the cognitive load whilst maintaining a non-trivial voluntary human agency in areas of existential importance to sales and pre-sales operations.

Performance Gains

Based on the quantitative indicators of the pilot implementation, it is possible to note the strong performance growth in a number of pre-sales KPIs. Assistants based on AI were integrated into the CRM and presales automation stack in use by the firm (using assistants' complexity like Salesforce Einstein and custom GPT-based copilots). Twelve SEs reported performance data that were collected and compared to their pre-AI-performance. The comparison showed evident improvements in productivity, proposal accuracy and cycle efficiency.
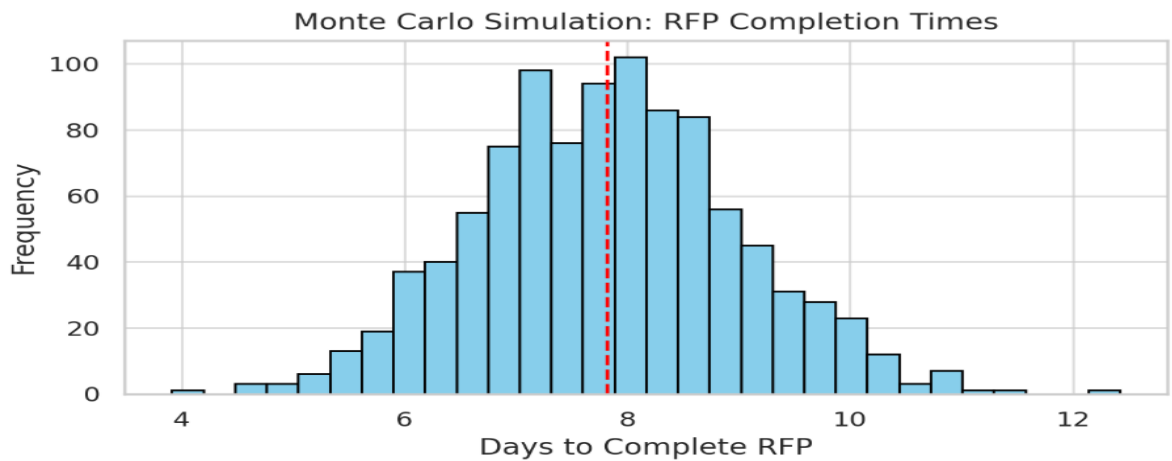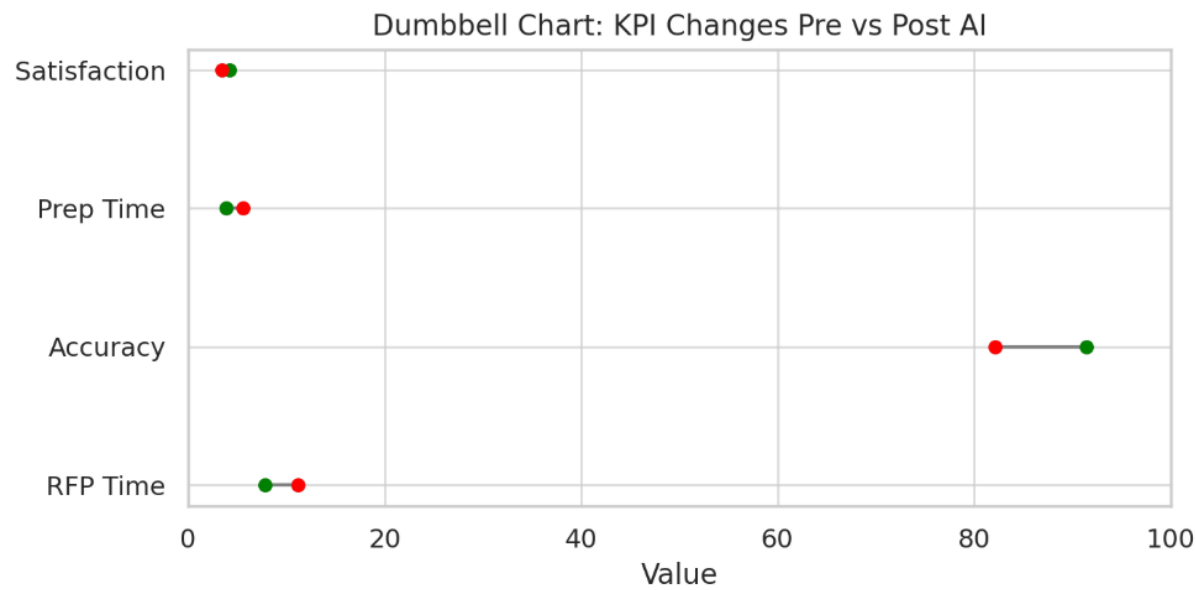
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Table 3: KPI Comparison

KPI	Pre-Implementation	Post-Implementation	% Improvement
RFP Completion	11.2 days	7.8 days	30.4%
Solution Accuracy	82.1%	91.4%	11.3%
Demo Preparation	5.6 hours	3.9 hours	30.4%
SE Satisfaction	3.4 / 5	4.2 / 5	23.5%

These enhancements bring out the fact that shared control configurations provide maximum leverage particularly in solution design and customization. Nonetheless, sequential mode was also beneficial, as it allowed SEs to add to the products created by AI (be it use-case narratives and pricing structures) and not lose control.

One of the facilitators of such outcomes was a set of logic ensuring the task orchestration incorporated into the ASE assistant. As an example, the next pseudocode can be introduced being used to explain sequential delegation model used when responding to RFPs:

```
def generate_rfp_draft(client_requirements):

    ai_draft = ai_model.summarize_and_match(client_requirements)

    human_review = se_team.review(ai_draft)

    return finalize_submission(human_review)
```

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It is a simple yet powerful human-in-the-loop design in which AIs provide the initial draft and humans improve it - without losing judgment, subtlety, and conformity.

5.3 Cognitive Load

The teamwork model was also tested on the basis of NASA-TLX cognitive workload measures. The 48 task episodes were evaluated in which SE were measured under AI augmented and non-augmented conditions. The outcomes indicate that the perceived mental demand would be significantly lower in most cases and repetitive or documentation-intensive activities in particular. Although shared control model presupposes the active involvement of SEs, it contributed to the additional decision support and provision by means of contextual recommendation and data visualization.

Table 4: Cognitive Load

Task Type	Without AI	With AI	Mental Demand
Demo Customization	72.3	54.1	-25.2%
RFP Writing	65.8	41.7	-36.6%
Solution Architecture	83.5	66.2	-20.7%

In order to facilitate this workflow, this team developed a lightweight prompt chaining system based on LangChain and GPT APIs. In following is a simplistic example of a multi-step prompt handler that can be used in demo customization:

```
def build_custom_demo(client_profile):

    features = ai_recommend(client_profile)

    script = generate_narrative(features)

    return create_slide_deck(script)
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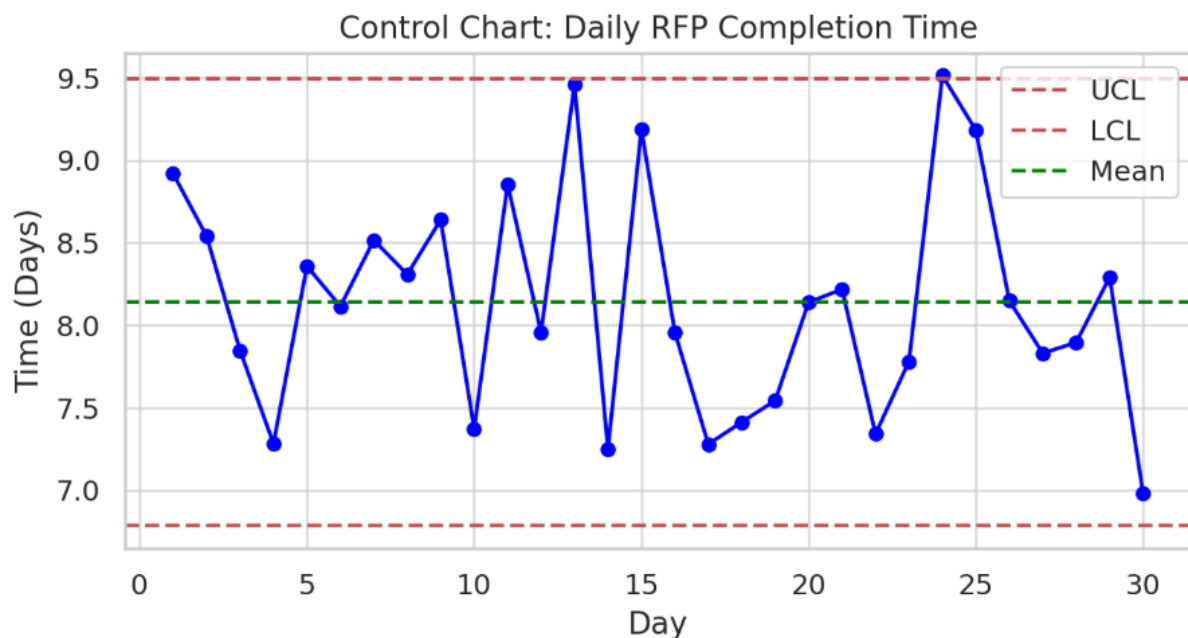

Through this stratified interface, AI could contribute to peeking at the generation of early ideas but SEs could have all the control at the final presentation layers- showing feasible human-AI co-generation.

SEs had more trust in suggestions given by AI when the feature of transparency (e.g., confidence scores, explanation of rationales, etc.) was implemented. This is supported by the previous HCI report (Xu & Dainoff, 2021; Chignell et al., 2022) that trust and explainability will play a leading role in high-stakes human-AI cooperation.

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5.4 Feedback Loops

To guarantee long-term viability of ASE framework, a feedback loop structure was incorporated after plenty of levels. AI results like the prices models, product configuration, and draft of various responses were rated continuously based on usefulness, relevance, and saved effort by SEs. Upon these ratings, prompt logic and model weights were retrained and fine-tuned (in case they were available). This feedback process created a process of continuous learning and model precision as time went by.

Radar Chart: SE Satisfaction Dimensions
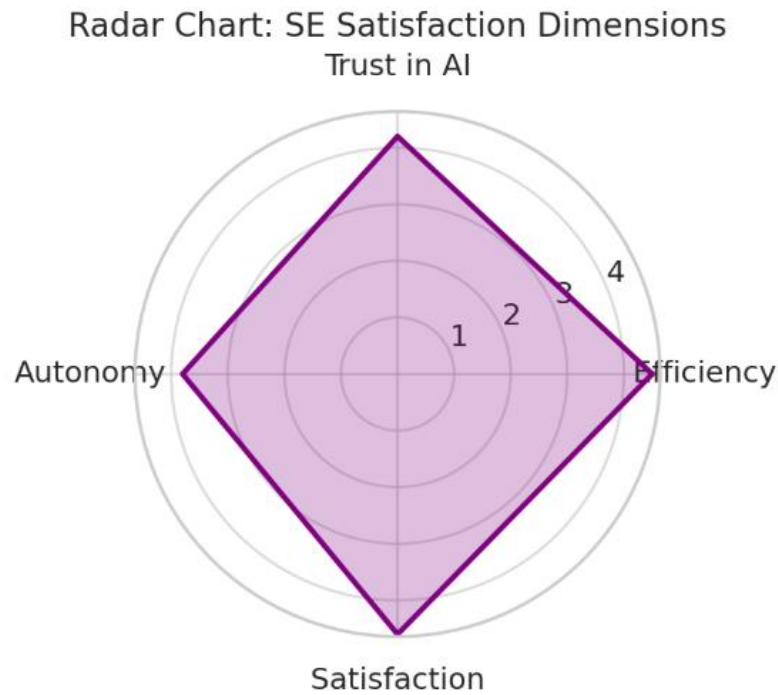
At the practical level, the integration of AI feedback included such mechanisms as:

```
def update_model_with_feedback(response_text, feedback_score):

    if feedback_score < threshold:

        log_issue(response_text)

    else:

        reinforce_pattern(response_text)
```

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The institutionalization of such model SE-as-teacher has enabled the system to not only increase the quality output as active stakeholders in the evolution of an AI system. Notably, SEs exhibited better degrees of trust and ownership, and these were possible since they were able to trace the manner in which their inputs improved on subsequent outputs.

The ethical issues were also observed. An analysis of all responses in AI was examined in the presence of bias, hallucination, and adherence to corporate language rules. Transparency reports and override options became part of its interface whereby the human was the last authority to all the contents that needed to be displayed to the clients.

The present paper has shown that the human-AI collaboration model that can achieve an improved presales performance, quality, and engagement is possible in strategic design. When implemented with the help of the patterned collaboration (parallel, sequential, shared control), Augmented Sales Engineer framework results in clearly defined efficiency and satisfaction improvements. Its success is based on the boundaries of tasks which are well defined, and how delegation should be done with judgment, transparency to build trust between each other, and its feedback loop.

Scalable integration to enterprise CRMs, real time adaptability and better alignments to sales methodologies like MEDDIC or Challenger based models are the areas of implementation that can be furthered in the future. This

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study establishes a basis that leads to more resilient, ethical and effective hybrid smartness in high value, high context enterprise sales environment.

V. CONCLUSION

The results confirm the hypothesis that the Augmented Pre-Sales Engineer framework is a workable programme to get optimal human-AI collaboration in complicated sales processes. The formal transfer of tasks and the results of the study in this direction reveal the potential contribution of AI in improving the workload situation in presales and maintaining human creativity and decision-making capabilities.

The major facilitators, that include trust, feedback mechanisms, ethical design, are important to continued cooperation. The findings also provide the sensible direction to sales leaders who want to incorporate AI to transform core sales activities without dehumanizing them. Through the design of synergy instead of substitution, the model opens the door to scalable intelligent presales systems in line with performance, as well as human values.

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