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Chapter 6: Consulting 4.0: The role of intelligent agents in client engagement

6.1. Introduction to Consulting 4.0

Enterprises have been diverting resources to leverage intelligent agent technologies (IATs) in process design and execution to make their systems efficient and maintain competitiveness in the marketplace. Smart agents and intelligent agents, in marketing, advertising, and the clients' domain, have attracted considerable attention. The goal of IATs is to design agent systems that are characterized by intelligence and veracity, present a human-friendly interface, and facilitate the client's engagement in marketing processes. The majority of research in marketing has focused on the architecture, design, deployment, and ethical guidelines surrounding IATs in addressing clients' needs, and some have highlighted the limitations of IATs in designing and executing marketing processes. All briefs of intelligent agents and artificial intelligence (AI) agents are elaborated, along with their advantages, utilizing their expertise, outlook, snags, and products. The discussion is also reported on research work in AI in marketing, including micro-level studies on textual conversations, creativity, exodus by intelligent agents, and macro-level studies on the impact of IATs on the marketing mix, decision-making, transactions, and the future of the industry overall.

Emerging regarding engaging clients, exacting design features imparting differentiation, and a host of research areas on the implementations of IATs and AI systems in marketing are highlighted. Intelligent agents continuously perform three functions: perception of dynamic conditions in the environment; action to affect conditions in the environment; and reasoning to interpret perceptions, solve problems, draw inferences, and determine actions. Intelligent agents are typically implemented in software or hardware. Software agents are programs that engage in dialogs and negotiate and coordinate transfer of information. Physical agents are devices that sense the environment, reconstruct a model of the environment, and interact with it, i.e., manipulating the environment using actuators . Agents are referred to as social if they are designed to interact with others.

An agent's interface is social if it allows communication between agents such that coordination of diversified, autonomous agents is maintained.

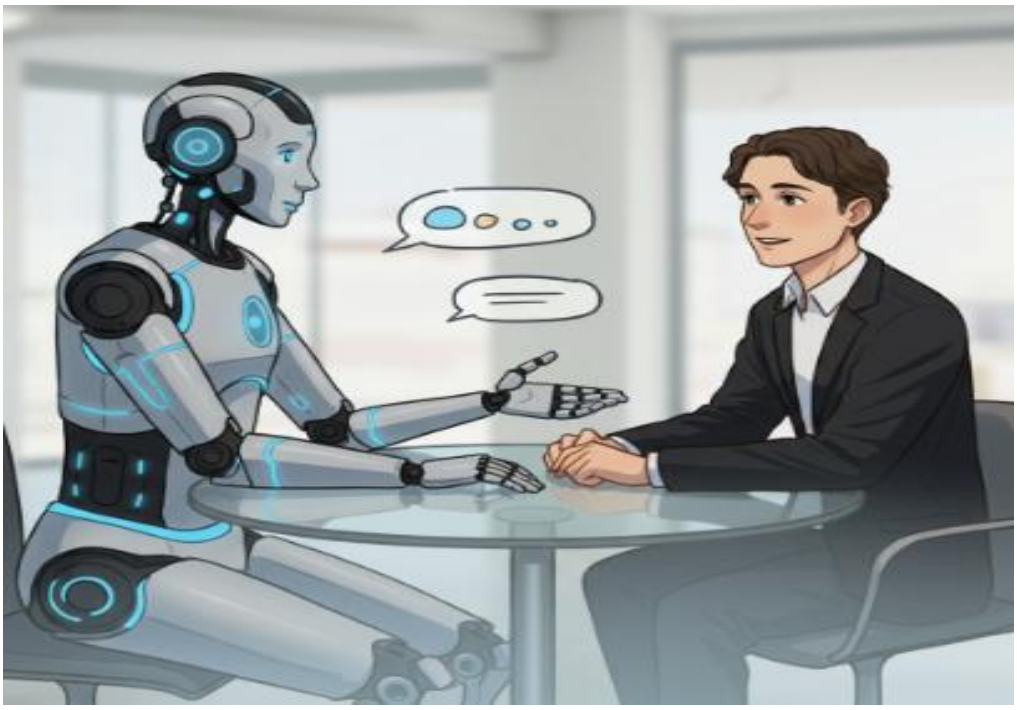

Fig 6.1: Intelligent Agents in Client Engagement

6.1.1. Background and significance

The advent of knowledge workers focused on extracting value from business development data, paired with advances in useful technology, have set the stage for radical new approaches to decision making and insight creation. Big data, high-speed proportional scaling desktop computing, machine learning that builds on established statistical tools, and cloud-based economical processing capacity and storage, offer great opportunities to augment human expertise in informatics-based domains. Human-like software agents can work with data-heavy tasks, learn from providing answers, and suggest hypotheses for human review or run what-if tests for historic decision support.

Software agents that process information and offer suggestions based on machine learning can be seen as a financially attractive out-sourcing of market manipulation, while “robo-research” tools can provide a low-cost option for tracking corporate reputation indicators, capturing investor events, and sentiment classification. Existence of software agents is noted on corporate and fund manager sites, generally in support of

investor relations and research. This paper focuses on a specific type of knowledge worker, market modeling consultants, and the specific tools available for them.

Five knowledge agents that create insights for consultants are introduced. These tools can replace human operators in certain tasks, but it would still be necessary to create additional cognitive semi-intelligent knowledge tasks to take advantage of new opportunities. Artificial general intelligence is expected to offer more interesting tasks for knowledge consultants in the future.

6.2. Understanding Intelligent Agents

The agents' thorough understanding is essential for the effective and practical design of intelligent agents. Each of the aspects mentioned so far needs to be deeply understood and applied to the context of the designer's rigid agents to create rich intelligent agent systems. Expert designers will be better able to overcome pitfalls. Its benefits may be huge, given that the intelligent agents can automate many time-consuming, tedious, and difficult design tasks. Traditionally, computer programs were dependent on code only. Code defining the program was input by hand via a keyboard with no visual representation. Computer programs and computer programming were abstracted away from physical reality, and all talk about computer programs or programming was purely in the language of representations. Although control theory was invented in the 1940s, "agent" was still an elusive concept until the advent of personal computing more than three decades later. Even the word "agent" had to be imported from law, biology, and sociology to be adapted to computing. Agents are entities that take one or more actions in an environment, using some combination of deliberative, reactive, social, and hybrid approaches. Agents can be intelligent or unintelligent; computerized or non-computerized; software or hardware; static or mobile. It is believed that a non-intelligent agent can be programmed in a programming language; an intelligent agent cannot be programmed, and hence it is impossible to build one in the scientific sense, because no formal language can capture the agent's intelligence. Agents are now being built on the Internet and in the WWW. These agents perform tasks for users or for themselves.

6.2.1. Definition and Types of Intelligent Agents

Intelligent agents are computer software or programs acting over the Internet and other networks to accomplish certain tasks based upon intelligent behavior. Intelligent agent is a term describing a very broad class of objects, both real and imagined one's. Ideal agents fully behave according to the definition, but partial or more restricted agents are the one's encountered in everyday life. It is helpful to informal definitions of agents from everyday life. Robots are usually thought of as intelligent agents, they are definitely not

intelligent and glowing objects. A robot is a life form like the mechanical creatures of Artemis Fowl, a droid from Star Wars. Robots are real world manifestations of intelligent agents. The first law governing robotic behavior conceives agreement: a robot may not injure a human being or, through inaction, allow a human being to come to harm, robots simply do not harm people, and this seems to cover most valid robots. These are especially prevalent in scare scenarios, like military applications or as evil artificial humans like the Terminator, very intelligent reasoning robots dedicated to the annihilation of all human life.

An intelligent agent is a software program or character that can autonomously learn the art of action and show intelligence in executing tasks on behalf of users. Some agents are of higher intelligence than others, and some are simply designed for specific tasks. Intelligent agents function as simulations of reasoning whenever an agent is allowed to initiate actions, plan some course of actions or abstractions that occur on the globes. Some intelligent agents simply react as responses to one of his environment states. This testaments a less sophisticated and dumber type of agent. Many computer programs often exhibit some degree of intelligent behavior across a whole range of some intelligence measures. The term agent is vague one to; agent may mean action, and fit into definitions in natural sciences that study a larger phenomena which includes intelligent agents as just some part of it. Academic research into intelligent agents is mostly found in disciplines like for example.

Software agents act on behalf of a user or other program to carry out a given task. Intelligent agents are capable of flexible actions in some environment perception. They combine reasoning and knowledge representation, learning, and communication capabilities. Software agents are self-contained, model or system resources or actions within it. They may act independently and change their behavior based on experience, allowing adaptive responses to dynamic environments. Multi agent systems consist of a group of loosely interconnected agents that distribute a given problem; a set of agents can perform a task that is beyond individual capability, and cooperation evolves using some communication language. Collaborative agents cooperate to achieve a shared goal; history–based agents share information and knowledge among the group.

6.2.2. Technological Foundations

It is paramount that the effectiveness and applicability of the proposed framework is demonstrated. The method followed to develop the framework is developed using stakeholder theory and the empirical examination is essential to showcase the applicability of the framework. Evaluation using a multi-pronged research agenda enhances depth and rigor of the results and evaluation. Understanding, testing, and

improving the parameters would enhance the utility and effectiveness of the proposed framework.

Different industries and sectors vary significantly in the nature and variety of publicly available data; a focus on one industry or sector will isolate certain challenges and approaches as well as broad parameters that apply generically across a wide variety of industries or a balanced combination of the two (Gounagias et al., 2018; Aladebumoye, 2025; Apex Accountants & Tax Services, 2025). Industry experts from the private or public sector will provide valuable insights regarding the data and technological challenges specific to an industry or sector. Selecting a specific industry to focus on will allow for the applicability of the broad data-science plan across diverse firms in that industry.

There is an extensive research agenda in design science within IS that can be leveraged to guide any changes or refinements in the initial framework. Different design-science research questions regarding its completeness, usefulness, cost-effectiveness, epistemic legitimacy, and acceptability could be asked. If extensive refinements are desired, a multi-pronged evaluation using differing research strategies would enhance rigor and credibility. A combination of focus groups with intended end-users as well as participation by industry experts is comprehensive in terms of uncovering potentially useful redesigns and refinements.

6.3. The Evolution of Client Engagement

The client engagement landscape has evolved over the last 30 years from a fundamentally relationship-based concept to a blend of both relationships- and technology-based interactions. The original, pure relationship-based model dominated client engagement in the 1990s. This phase was characterized by pure personal interactions between consultants and clients without the intrusion of automated technology solutions. Organizations sought out trusted advisers from consulting firms, who were provided with ample opportunities to build rapport with their clients. A simpler time, these were the “good ol’ days” of consulting with prestige (high fees) attached to tangible value delivery being distinguished from the mischief now associated with big data or mega software implementations. In the 2000s, things changed, and engagement models became predominantly one-sided and transactional. Consulting jobs were typically awarded through request for proposal processes, followed by investment in tools and techniques, with limited opportunity to build rapport with clients. Events during this period included the downfall of some of the formerly most prestigious firms, a slew of class-action lawsuits against consultants, consulting outlawed as a profession in some countries, and seriously challenged profitability. In the 2010s, engagements once again became more balanced as a mix of one-sided and two-sided interactions with

both consulting firms and clients increasingly working with and cultivating digital intelligence agents. Events during this period alluded to above contributed to the awareness that both parties needed to work collaboratively to blend human and machine intelligence. This collaboration was hastened by the emergence of massive change agents including the internet of things, big data, social media and artificial intelligence. In the 2020s, client engagement models have progressively more closely mirrored general society with the emergence of intelligent agents designed to further develop the insights, actions and recommendations made by human consultants, thereby ameliorating some of the transfer of responsibility onto machines feared by the latter. As clients embrace intelligent agents in-house, consulting firms too are beginning to seek advantage from in-house intelligent agents.

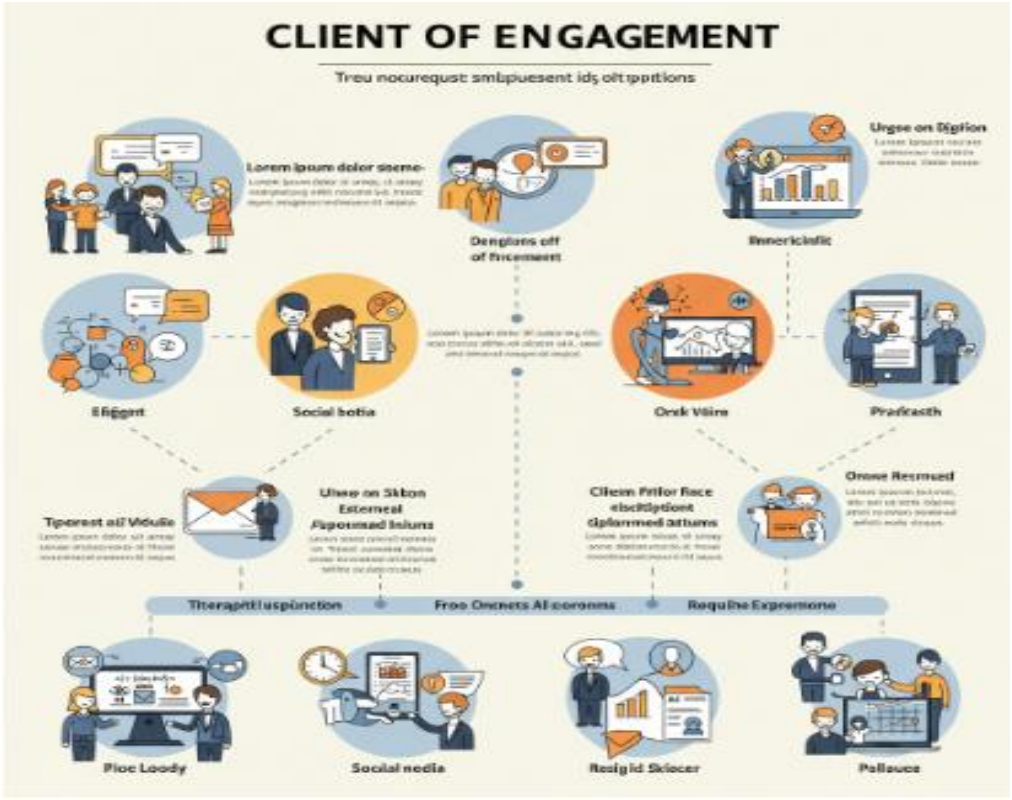

Fig 6.2: Evolution of Client Engagement

6.3.1. Historical Context

Consultants are increasingly looking for ways to leverage technology and automate processes. Management consulting is particularly amenable to digital approaches. The traditional expertise-overtaking model of consulting is being challenged by aggregators

of expertise. The automation of consulting is evolving rapidly. External consultants can be entirely replaced with generic robotic agents advising clients without human engagement. New firms with a technological focus are evolving as a combination of tech and consulting; ubiquitous technologies act as advisers. Incumbent firms are increasing investment in business intelligence; these tools can answer only well-structured problems. Structured processes are outsourcing-prone and conventional responses are digitizing; computerized BPM systems can address them without additional consulting. Exploiting the opportunity? Careful, as approaching new questions can be at the outer limit of their knowledge and capacity to adapt.

There is a diversity of robotic phenomena ranging from basic bots to a set of cognitive skills emulating intelligence. With technical maturity, user-friendliness, and cost-improving, the development of robotic entities is moving to third parties. The rise of social robots questions the human agents' foundations. Meaningful engagement is critical; an intelligent agent does not appear human-like. Positive bias towards expecting a higher level of intelligence fosters trust. Nevertheless, ungrounded expectations appear unfounded, resulting in a negative bias towards the whole robotic phenomenon.

6.3.2. Current Trends in Client Engagement

Consulting projects are, by their nature, complex and uncertain. This is especially the case for management consulting where consulting project teams deliver customised services that are shaped by client requirements. The set of services provided has an impact on the output of the engagement. For these reasons, client involvement in consulting projects is critical to project specification and execution. Client involvement is the degree of client participation in consulting project-related work. Involvement can take place through a variety of actions including requests, feedback, and joint work. Consulting teams and consulting firms can thus constrain, facilitate, or construct client involvement. This research distinguishes between levels of client involvement. Consideration of client involvement as a continuum-based construct (no to full involvement) allows for a detailed understanding of its impact on project outcomes. Greater involvement is proposed to facilitate better client input and reduce information asymmetry between the consulting team and the client. Client involvement in the form of coached interactions can thus contribute to greater project success.

Two types of client involvement are examined with distinct implications for consulting project outcome. Simple client provision of input allows for and increases the available amount of information on client input without discernible effort. Projects with simple client involvement are less contingent on appropriate management by the consulting team. In contrast, coach-guided client interactions require intensive management efforts and attention from consulting teams. Much can go wrong in these projects. However, if

managed appropriately, coached interactions have the potential to vastly increase input on inputs and better project performance. Practical implications include a recommendation to consider client involvement more holistically from the inception of an engagement. Coached interactions are particularly useful if the consultant team is inexperienced. Both client involvement types are an important part of professional services and consulting firms' service delivery strategy. While consulting teams feel the impact of client involvement on the project, this research highlights that there are more or less useful distinct types of involvement.

6.4. Impact of Intelligent Agents on Client Engagement

The advent of consulting 4.0 is radically changing client engagement in strategy consulting (Savić et al., 2021; Zhang et al., 2022). At the forefront of this trend is an AI agent called Compendium. The digital counterpart of an engagement manager, Compendium interacts with clients on a 24/7 basis across the project's life span. It performs simple, repetitive tasks such as probing inputs, sharing procedures, summarising deliverables or updating requests. Its primary purpose is to enhance client satisfaction while maintaining internal productivity.

Prospective case-study organisations are tier one global strategy consulting firms, informed client engagement being their largest source of sustainable competitive advantage and consulting 4.0 leading firms deploying intelligent agents to deliver this. A review of greater than 200 documents describing consulting 4.0 meta-firm capabilities pinpoints five functions in need of automation, namely, knowledge acquisition, knowledge flow development, designing work methods, monitoring progress and gathering feedback. Subsequently, 19 technologies are identified to automate these functions, including AI agents, NLP engines, legal and cognitive reasoning systems. Their explicit consequences on client engagement, client intent production, and dissemination being understood.

To understand the transformational impact of intelligent agents and draw nuanced insights on its downsides, the role of specialists in client engagement needs to be studied. Once the AI champion, the specialist will deliver tasks less complex than current smart tools regardless of their frequency or configuration. In doing so, they will manage client expectations about possible deliverables rather than offer concise answers to deep inquiries. They will instead advise clients when they seek involved discussions about economic principles or reasonable projections of future market cap. As a young specialist, the specialist will need to learn to manage engagement with the engagement partner and the knowledge partner.

6.4.1. Enhancing Communication

In recent years, Intelligent Agents (IA) have been increasingly employed in customer-facing business functions. Along with their appeal, available capabilities and the potential they offer for transformation, IAs also raise new challenges. An ongoing challenge for IA providers is to expand their applications beyond support for routine tasks. Routine task support is limited by both technology readiness and human factors. The most promising future applications will involve enhancing communication between human users and IAs. The innovations presented in this section aim to close the gaps identified above. Moreover, these innovation opportunities are expected to be well aligned with the future demand for communication enhancement. Herein, IAs are examined from a human-agent communication perspective. Relying on insights from several research fields, areas ripe for innovation in connecting IAs with users over natural communication are described . For manufacturers and suppliers of IAs, these innovations offer new avenues for transformation. Initially, the proposed enhancements rely extensively on the existing speech technology stack and scripting functionality offered by speech service providers. Also envisioned in the proposed innovations are advances along the research frontier. Addressing these opportunities will accelerate the proliferation of use cases in which IAs are deployed to augment communication and understanding. IAs are viewed as simulators for and agents of humans, and hence a novel classification of IAs is introduced to describe design and application choices made to leverage and determine the theories and technologies of human-agent communication to a greater extent. It is expected that intelligent agents will be firmly established as communicative entities that augment human communication, be part of everyday life, and design interactions.

6.4.2. Personalization of Services

Through the networks of intelligent agents that will evolve, companies will be able to establish a closer relationship with their clients and develop niche products/services addressing the personalized needs of groups of clients. An intelligent agent will build a profile of its client detecting its net path or through defined questionnaire answering. When a new product/service is introduced by the vendor company and feedback data is available from other agents, the agent will check if it belongs to the group of clients who will be interested in it and check in this case the client’s activity in order to cater the right information to it. An intelligent agent can improve the way the information flow is handled between human agents. Human agents will only point out relevant activities outside their firm, enabling them to focus on important information. The expert system can in turn create advice sent to a client’s agent and the human agent will not have to search for the niche product/service and will be able to concentrate on other tasks. To

reap the benefits of Automation 2.0, firms should encourage personal intelligent agents (PAs) to access their resources autonomously.

Personalization of a bank service calls for the continuous improvement of various diverse methods of constructing the client's profiles quoting his/her expectations. That is required for intelligent agents to function properly in the banking domain. Inner and outer elements must be considered. Examples of inner elements are the indicators of risk assessment of the client's behavior collected into the bank's legacy systems and the attributes of money laundering. Outer ones represent the client's acquaintance with new banking startup technology as concerns behavior/economic factors which are detected in networks of agents and are accessible over the Web. To achieve the broader perspective as relates to the assessment of the client's profile and the provision of personalized advice, it will be necessary to develop a hybrid of rule-based intelligent agent and a memory agent.

An option is to distribute an ontology-based questionnaire to improve the knowledge of the expert system concerning the client's expected attributes of recommendations and it can enable the mandatory clients to answer it through some intelligent agents where parsing would be done. New attributes of the client would be suggested which could be of interest for all banks or just some of them. A set of new rules should be created along with the construction of thoroughly elaborated entities of the hidden parts of the banks' organizations compatible with the WWW standards. In-depth transformations would need to be made in the banking agents and systems. Standardizing the functional aspects for modeling trading agents' functionality would ensure furniture compatibility no matter what system language the agent was designed in.

6.4.3. 24/7 Availability and Support

"Ask, Think, Try" - the Smart Agent Architecture. 24/7 Availability and Support In the '24/7' era of mobile commerce, consumers expect to have the freedom to ask any question, to buy or order something day or night. This demand was only met to a limited extent. When the current web service agent systems are viewed through the prism of the 3-layer space-oriented architecture, there is a needs layer for agents that can't be filled by today's agents. As a consequence, many problems are shelved for now by web service providers. Examples of such needs concern users' questions for the best and cheapest air-travel to Chicago tomorrow, tracing land-mail items, retrieving location-finding maps with distance to some place, anticipating demand on food in the catering business, and so on [8]. One possible road to a solution is to implement so-called smart agents as knowledge-based systems that gather, retrieve, and process information and keep track of the client's and the process' policies and dynamics. They must be able to structure the knowledge explicitly using information structures compliant with web standards. And

they must be able to reason about a model of the domain process controlling other agents. A multi-agent infrastructure should provide mechanisms to find out the best set or combination of agents to reach a certain goal, a place for conducting the joint process, and a place for communication between agents.

Such a service may be used to mediate between clients with a (set of) needs and agents with a (set of) (active) qualities, to reach a good match that can be replaced by the needs as agent know how. A multi-agent infrastructure should simultaneously manage three layers. 1. The application layer consists of cooperating agents, which may also be agent-brokerers. Each agent is responsible for a certain role in the process within its knowledge, abilities and process control. 2. The infrastructure layer consists of a set of relevant 'orbital' multi-agent systems, each from a web service provider. Web agents which know how some systems work and how to reach them are orbit agents. 3. The coordination layer which coordinates between the two layers. Commercial and scientific agents are competing to be the hub for a certain business niche. It is anticipated that a new market of (not-so-)smart browsing agents will emerge for information retrieval. Examples of such agents could be an intelligent search agent, cooperative book agents, and niche cooperative agents that filter secondary information on a particular topic from a (set of) target web-sources.

6.5. Case Studies of Intelligent Agents in Consulting

Intelligent agents, their roles, and their uses in consulting have been explained until this point. Examples have been given throughout the section to provide a precursor to the rise of intelligent agents in consulting. Many successful implementations and uses of agents exist, ranging from mining and catalyzing data to using agents to determine marketing mixes. Various firms have demonstrated the power of intelligent agents on the client side as well. The use of intelligent agents is providing companies on the consumer side a more effective view of their data and even assisting with the pre- and post-proofing stages of data volatility. Other inefficiencies also exist in the ability to pre-process, output, and make use of the vast amount of information mankind now has at its disposal. Current clients expect highly intelligent agents at low cost and quick processing times, and within domains that have a wealth of interactivity requiring less commentary from developers.

A second set of cases describes the use of intelligent agents in the consulting service to brands and products. Last fall, at one of the largest fairs in the world, global leaders in tech, music, and the telecommunications industry debuted a new initiative. As a result, the firm's ebook-like Customer Interaction Generator was nearly destroyed. This implementation of an intelligent agent sent cross-queries to free-text databases in a specified file format. Market basket analysis was used to find the best discounts and

promotions after each cycle. A word processing enhancement can also process text files with pre-defined tags that determine the length of analysis.

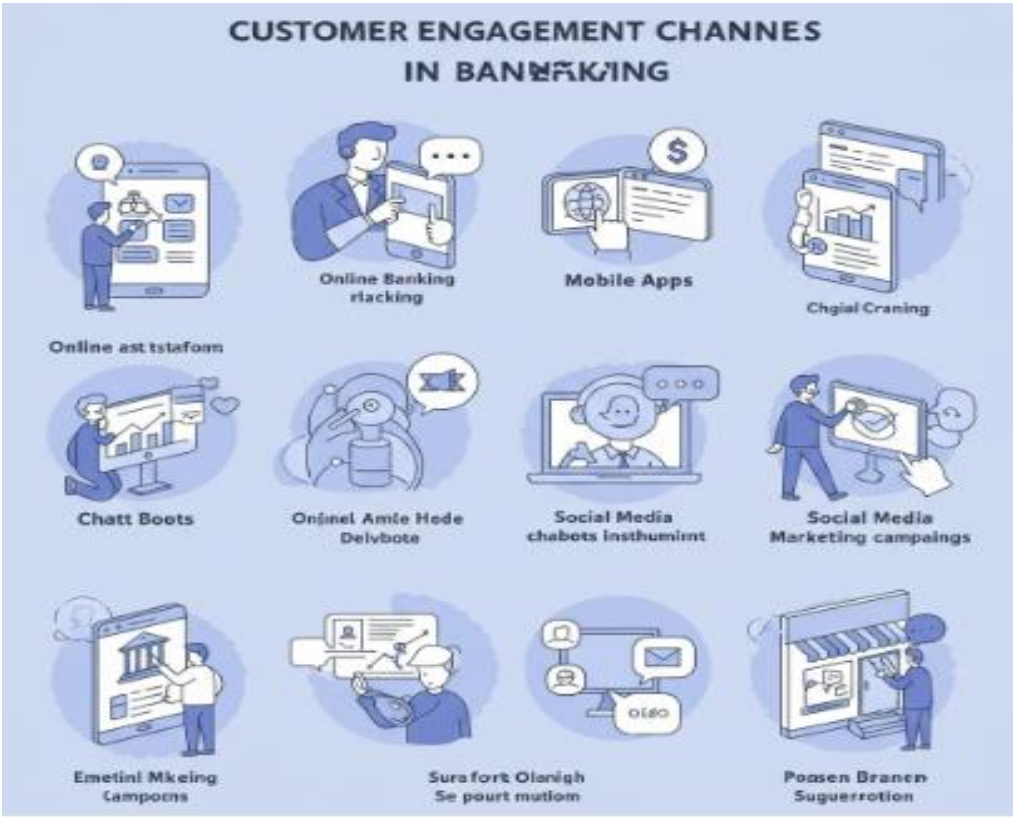

Fig : Customer Engagement Channels in Banking

6.5.1. Successful Implementations

Below are descriptions of consulting approaches that effectively use intelligent agents in client engagement.

An approach applied in practice by identifying different types of intelligence agents that clients may use to augment their internal teams is the multi action agent (MA(S)2) for risk evaluation in small and medium enterprises (SMEs): MA(S)2 is a web-based expert system for evaluating risks and generating proposals for reduced risk. It was designed to facilitate the easy acquisition and transfer of knowledge and to enable large-scale diffusion of advances in risk evaluation technology. A multi-agent web system for risk assessment management was created. A graphical interface for interaction with the system was developed. Quintessential processes of knowledge mining were implemented. A knowledge base was created for risk analysis using the expertise of risk

managers and for knowledge transfer. Dynamic knowledge update by a user with modifiable access levels was made available.

Another approach is digital platforms in consulting: Some incumbents within the consulting industry have begun competing in this way by either establishing their own platforms or acquiring third-party platforms. Still, at the moment, not a single consulting platform has achieved a high rating as a prominent example of a successful digital platform. Therefore, it remains to be shown why past attempts by consulting firms to implement such digital platforms were unsuccessful. This identifies and analyzes 14 important success factors for a successful launch of a digital consulting platform from the perspective of crowd-sourcing platforms. Determining the main action areas within planned platforms during transition to the implementation phase will encourage management teams at consulting firms to consider the ecosystem design aspect of planning and implementation more carefully.

6.5.2. Lessons Learned from Failures

Lessons learned from failures during initial interactions between agents and humans are relative to the types of malfunctioning. Failures in the task generation process and the error process are associated with a disruption of on-going conversations or tasks and thus affect trust in autonomous agents more than task-dependent error types. The differences in trust decline due to failure type demonstrate that system design should focus not only on failure recovery after a malfunctioning but also on assignment designs to lessen the occurrence probability of malfunctioning. Intelligent systems can be trained to fulfill agents' tasks, thereby supporting agent-assisted negotiation between agents and humans. Such collaborative negotiation takes the form of multi-agent systems (MAS), where multiple agents interact with each other to reach goals or fulfill tasks collaboratively. Multi-agent user negotiation systems have also shown promise, but the development of these systems aiming at bargaining, contracting and agreement between users is still in its infancy .

The main tasks for agent negotiation systems include the understanding context and sentiment, interaction reasoning, and multi-object representation. Better understanding of user context is essential for successful negotiation systems. Directly using dialogue acts for analyzing user and agent intent is more effective than slot-filling and intent classification. Further studies are required to better understand the roles of emotions and sentiments in agent negotiation processes. Generating and supplying context-aware abstracts about tasks, agents, and negotiation processes would significantly improve negotiation agents’ performance assessments during and after negotiation interactions. Having background and history knowledge is important in understanding latent user goals and negotiation strategies and managing and adjusting expectations (inputs,

proposals, and challenges). User studies are essential to narrow the understanding gap between intelligent agent systems and human users, consequently developing a more intuitive design of agent-user negotiation systems. Further investigation areas include online expectation retrieval, comparing user and agent preference modeling, understanding user input spanning time, adjusting user expectations, and learning user preference and satisfaction from negotiation outcomes.

6.6. Challenges in Integrating Intelligent Agents

As the use of intelligent agents becomes more prevalent across industries and processes, organizations face a diverse set of challenges for effective integration. Existing business processes must be analyzed to determine how agents fit into the current flow of activities, existing systems, user groups, and technical environments. Topics requiring analysis include determining which processes can be improved with intelligent agents, which intelligent agents to deploy, and how agent tasks fit into current collaborative and/or autonomous task flows. Addressing these key topics gives organizations a better opportunity to effectively integrate intelligent agents into their operations.

Another key area for concern is the current technical architecture of the organization's operations and applications that must be taken into account when planning an agent-enriched environment. This can include anything from on-premises engine rooms and monolithic applications that do not readily expose any services through APIs to hybrid architectures with various cloud solutions. There are many considerations for developing the agent strategy and architecture in conjunction with the actual agent development and deployment as regards process knowledge representation, agent intelligence, agent composition, and autonomy. It may be advantageous for organizations to define their strategy and architecture for integration and deployment of intelligent agents in cooperation with knowledgeable consultancy firms or academia as integration decisions influence the broader intelligence and development of the agents . A company initially developing and deploying a single intelligent agent may focus more on defining agent-specific technical standards and component specifications. However, as the agent landscape in the company evolves, more focus is needed on organizing the agent architecture and the interplay between functional, data, and technical architecture.

Next to the organization of systems, usability and user experience studies must also be conducted to ensure that the intelligent agents' interfaces and experiences employed in tasks and transactions are logical, efficient, and enjoyable to use. All user experiences between the intelligent agent and agent user should be defined to either reduce unwanted experiences or further optimize the needed experiences. A large number of cases addressing the intelligent agent user experience have already been published, but in many of those cases, intelligent agents have only been used in consumer-facing

communication, games, and similar external context. Other topics requiring consideration include adoption and acceptance of intelligent agents by users.

6.6.1. Technical Challenges

While the consultancy industry benefits from consulting agents, the adoption by the consulting firms would be challenging. Agents would need to be created to engage, govern and augment professional consultants, which means integrating into the firms. The governance agent will pose challenges because the firms would not be willing to share their knowledge. The knowledge of firms is a competitive asset and is usually protected by strict confidentiality. Further, reviewing the work of human consultants cannot be done without the understanding of the content and its context. Knowledge engineering that endows agents with such knowledge would be non-trivial, making governance much more difficult in consulting than other industries .

The augmenting agents will improve the work of consultants, but will also create doubts on trustworthiness. The decisions are only as good as the knowledge in the knowledge base. Domain knowledge will be hard to engineer and any gaps on commonly accepted rules or heuristics would need to be disclosed. Also, the consulting firms would need to share data on previously consulted organisations as the quality of solutions will depend on this quality of data. Since data is not shared by consulting firms, this knowledge will be lost to the augmenting agents. Therefore, the applicability of educated agents is questionable.

Grounding suggests that agents can use factual information from the environment together with knowledge in the knowledge base to arrive at solutions. Therefore, the base knowledge should not only contain rules that capture domain knowledge but should also hold heuristic knock-out rules that could eliminate a lot of candidates from a larger set of options to improve scalability to facilitate the use of the agents by decision makers. This indirect and non-exacting form of knowledge does not always need to be shared by the consulting firms.

6.6.2. Ethical Considerations

The estimation of construction costs is often realized by two competing approaches, with complex aseismic studies being performed for every building. The first approach is with prone-to-error calculations performed on pen-and-paper. The second is with a broader view covering zoning initialization by an algorithm, but engineering decisions about elements and modeling complex criteria and loads are still manual and every analysis is treated independently. To counter the first approach a solution has been researched and

promised to construction academics and engineers, convincing them that implementation of proposed methodology with real time structural analysis for the second approach would greatly enhance the comforting side on costs estimates and much higher reliability. To counter the second approach an integrated common high-performance computing platform covered vertical environments is being developed. This cross-platform is built on a NoSQL environment, using cloud-based target, dealing with graphical BIM, working in Basic programming with Python sockets. While phases are being mulled, parts dedicated to zoning tests and tensor fields have decided to be researched first. The design of the procedure without terrain elevation goal is finished though outputs found others unanticipated inputs ongoingly been studied to exploit. On tensor field a clever approach is being sought on the construction realism and on hypothetical simply ensembles wait to find a no decrease cubic latitude dependent function design.

Substantial uncertainty is tied to estimated construction costs and complexities with complicated modelling widen differences. Although numerous methods for cost estimation exist; only past projects and dependent channelised ones within each complex county territory by rich history and strict zoning cases are currently in use, resorting to difficulties of compilation, ineffectiveness, inexplicability and errors. To tackle construction costs' dependence on engineers' constraints a common understanding of New Construction Principles have been developed. Cost components' in terms of suitable Engineering Mechanisms have been categorized for the selected construction's limitations, their relation have been studied with differentiated base data and Non-linear Planning Tree Graphs on agents' thoughts' awareness of designed constraints. Active participation of builders' incompatible engineering inputs have been analysed and a community of thought on its automatic formulation has been explored. Whereas semi-locality was designated as proposed automation's goals. Now coded base-data transformation has proven approaches enabling ownership on any new structure. And seed-code designs of intelligent genetic co-builders have reached evidence orientation on anticipated optimal space partitioners.

6.7. Conclusion

The approach of using intelligent agents in client engagement is an incremental innovation that requires less resource commitment, which is fundamental for small-mid consulting firms (SMCF). A key imperative for SMCF's consultation intelligence is the need to remain future ready for the upcoming consulting 4.0 era. The earlier SMCFs embrace the concern of clients for the early adoption of intelligent agents and visualize the new era led by intelligent agents, the better competitive potential they can capture. Anything less will precipitate a slow decline followed by oblivion with full closure

following the arrival of the consulting 4.0 era, possibly 5-10 years later. Consulting firms adopting intelligent agents will be able to form teams with clients and pioneer knowledge that can leverage on the experience of the clients better than any consulting firm, and hence will dominate the future of knowledge consulting. The growing sophistication of intelligent agents and their ability to render services presently available only from human consultants will irreversibly alter the consulting industry. Competencies related to knowledge consulting will become inadvertently and openly available to clients who in turn will restrict their relationships with consulting firms to the most routine outcomes related to execution rather than collaboration on complex phenomena that require a mix of judgment, skill, and knowledge unavailable virtually anywhere else. Throughout this evolution firms which do not gradually grow their capabilities for conversing with intelligent agents face competitive decline, sliding into extinction by the time consulting 4.0 arrives.

6.7.1. Future Trends

The future of consulting 4.0 with intelligent agents offers numerous exciting prospects and creates an array of opportunities. By their nature and technology development, intelligent agents are on the threshold of potential broad adoption and use by individuals and organizations in plenty of professional fields. Some trends can be identified in the following areas: multi-smart agent system (MAS), incorporating several knowledge and software agents as consultant-client teams addressing sophisticated client issues; collaborative agents acting on behalf of several individual consultants; combination consulting-research systems; full-fledged intelligent agents acting on full services on behalf of clients; intelligent agents acting by and for organizations; and intelligent agents acting as co-consultants with their human counterparts in the consulting process. Adoption of intelligent agents in a consulting business setting creates the need for the upfront development of general and specific intelligent agents. The design of intelligent agents is a key factor for the success of intelligent agents in general.

Establishment and development of a successful ready-for-market intelligent agent requires, first, determining the markets and prospects for returning value. It is followed by developing the intelligent agent and preparing its marketing and sales. It is recommended to use a step-wise approach with the stepwise development of a minimal viable product (MVP) and its commercialization. The client domain experts and other organizational stakeholders are involved in the development and commercialization of intelligent agents. Because developing and marketing intelligent agents is an ongoing effort requiring an out-of-the-box approach, it is discouraged to involve conventional consulting firms in the process.

New consulting models utilizing intelligent agents will become available to clients and consulting firms. Changes in both the consulting profession and industry will create new demands, needs, and prospects for consulting firms, clients, and professionals. Close collaboration between consulting professionals, organizations, and knowledge engineers is crucial for preparation of successful intelligent agents; this is often a challenging endeavor. Both provocative concerns and ethical issues arise from the emergence level of intelligent agents.

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