SIX TECHNOLOGY & DESIGN TRENDS SHAPING FINANCIAL SERVICES IN 2019

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2019 brings a new world where your voice can navigate systems seamlessly, and our mobile devices will augment reality, bringing a new fluidity to applications with increased insight and perspective on the physical world in which we live. This is the fruit of groundwork laid in 2018 with artificial intelligence (AI), machine learning (ML), augmented reality (AR) and natural language processing (NLP).

AI, in particular, continues to evolve rapidly in financial services applications, with demand for 'explainable AI' to meet emerging regulatory scrutiny, and advances in 'reinforcement learning' are delivering AI-based systems with the ability to both adapt and react, responsively and in real-time, to different inputs and data points.

These technology-based advances, coupled with more minimalist, persona-based design trends offer the potential for dramatic changes in financial systems' functionality and design while presenting new challenges in how to address long-standing but newly-relevant concerns related to usability and privacy.

Read below to understand more about the technology and design trends that Capco Digital Labs envisions will have a significant impact on financial services in 2019 and beyond.

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Executive Director

1. CONVERSATIONAL AI

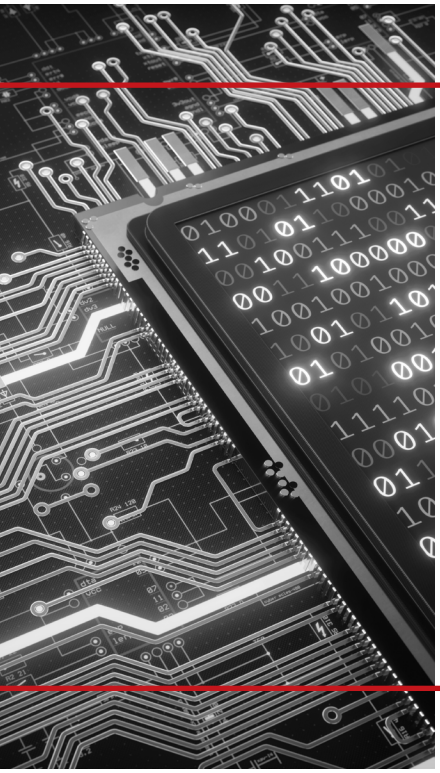
The features of conversational AI systems (cAI) are expanding,moving from gimmicky additions on devices to genuine features for products. A properly constructed and maintained cAI can allow both external and internal users of the platform a more seamless and intuitive interaction, thereby ensuring less friction and a higher likelihood of continued use. This will also allow segments of the population unable to interact with typical smartphone apps, such as the blind, illiterate, or physically disabled, to do so for the first time.

With cAI becoming more mature, we can then start to think about the design thought that goes into such an AI system, i.e. if the primary interaction with a device/app is going to be voice, how should the design incorporate these new realities? AI that is difficult to interact with won't be used properly, even if it's better than existing solutions. A part of these design shifts are a move away from a user interface to a greaterfocus on UX.

Take the AI home assistant devices Google Home and Amazon Echo as an example. With these devices, we see a minimalistic physical design with only simplistic patterns of light to indicate an ongoing interaction or the current state of the device, the UI then functioning as a method of reassurance to the customer that it is functioning as intended. These design choices lead to the device functioning as an unobtrusive, but everpresent assistant in the home or office. In the case of mobile apps, UI weaning can take place. In this design choice at the start of the initial interactions, a more involved GUI would exist, but as the customer becomes more familiar, the GUI would lighten leading to more of the UX to be focused on the vocal interactions.

Voice-driven interaction design also benefits from greater accessibility to disabled populations. In situation where a person is blind or illiterate the ability to interact via voice is a lifeline to features and abilities that they wouldn't necessarily have otherwise. If a user has difficulty interacting with a GUI due to language understanding abilities, the content of the interactions could be modified to better suit the customers language ability.

Recent developments have also made it possible to run real-time analysis of speech. This allows customer service agents to better understand their clients moods, insurance investigators to improve their accuracy in gauging fraud, and ensuring compliance to both company policies and government regulations in calls between customer service agents and clients. The cAI system can then subtly alter it's responses to take advantage of these new insights into the client.



2. EXPLAINABLE AI / MACHINE LEARNING

A significant issue with modern deep learning-driven AI systems is the lack of reason given for a particular choice. These types of systems commonly referred to as 'black boxes,' are a source of frustration for many users, especially when the reason for a decision is required due to regulation, or even just peace of mind. Not all machine learning (ML) algorithms are black boxes, for example. Decision trees are a class of ML model which the reasons for a decision are clearly shown, and there is a continuum of explainability, as well.

With all the recent advancements in deep learning and the significant increase in accuracy over previous methods, there is a desire to implement these models for as many use-cases as possible. We will then face the situation where the deep learning model may give better results than previous models, but due to the lack of explanation for why it was decided that we are unable to use the results. A truly explainable AI which has comparable (or better) accuracy than current deep learning models is clearly a desirable objective, and there are initiatives towards this goal from government (**1**), industry (**2**), and academia (**3**).

These explainations from the AI algorithms can form a sort of conversation with the user, allowing a better understanding of how the decision was made. This type of interface with the system will allow users to grasp the higher level principles of why the system made a decision without getting stuck in the quagmire that is all of the particulars of the systems behavior. These abilities, combined with other innovations towards AI-enabling accessibility can lead to a friendlier AI interaction where the system isn't something here to take your job, rather someone here to help you open a bank account, do your more efficiently, and improve your life.

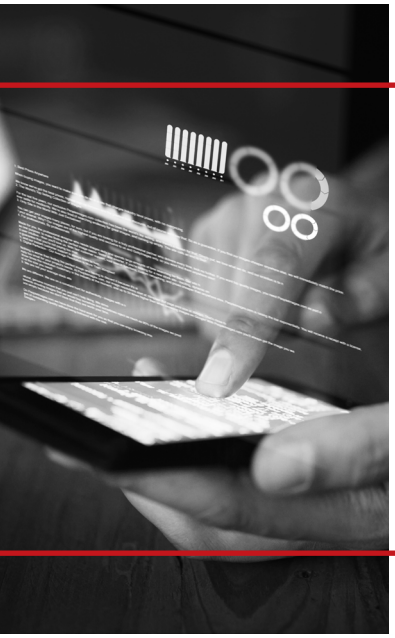
3. REINFORCEMENT LEARNING IN FINANCE

The first question you may have is "What is reinforcement learning?", which if you aren't in the AI field is a fair question. Simply put, reinforcement learning is a class of machine learning models which adapt their behavior in response to responses from the environment while they interact with it (**4**). The environment could be a warehouse, road, or stock portfolio. This class of model is of significant interest due to its similarity to how people learn.

Reinforcement learning has had a fantastic pace of progress in the last few years, especially in the area of robotics. While learning methods, such as deep learning, are typically either supervised[1] or unsupervised[2], reinforcement learning models learn from their active engagement with the environment which allows the system to learn as the environment changes as well. With this ability to learn from the environment as it changes, there has been significant interest in applying these algorithms to the financial services field (**5**).

While these algorithms have shown promise in the field of robotics and have had some initial applications to investment management (**6**) and trading (**7**), there is still work to be done in testing the robustness and working on the ability to explain the decisions the algorithms make. These advancements should help soothe any concerns that people will have using such algorithms in a high-stakes environment. An explanation of reinforcement learning can be seen **here**.

1. For supervised learning, the models are trained on a data set where the correct labels for the data are already known. These algorithms are typically classification or regression algorithms.
2. For unsupervised learning, no labels for the training data set are given, and the model learns similarities between the training data, these algorithms are typically clustering algorithms.



4. AUGMENTED REALITY

A couple of years ago, virtual reality (VR) was promising to become a huge technological trend. However, the excessive cost of equipment and the alienating character of this technology made it rise and fall quickly. Augmented reality (AR) witnessed VR flows as an opportunity, borrowing the virtual reality concept of a parallel universe, making it less intrusive, more versatile and accessible to a broader audience.

Superimposing digital assets and inform ation to the surrounding environment has been out there for a while, making appearances in social media, gaming, and entertainment. However, AR is finding applicability inside other industries, like health, finance, and education. In a world where different media is always competing for attention, AR has become an appropriate technology to awaken curiosity in potential users and increase engagement.

Augmented reality has found its way to become extremely accessible. Even though Mixed augmented reality equipment, such as the Microsoft HoloLens, is costly, smartphones are a great alternative to experience AR. The democratization of necessary toolsets to generate AR content has been crucial. Unity, Vuforia, AR Kit and AR Core, to mention some of the available AR Software Development Kits (SDK), offer free versions and vast documentation. There is a big online community generating open source assets, tools, and tutorials that permits anyone to create AR content without needing advanced coding or 3D modeling skills.

5. MINIMALISM

Users of financial services digital products are often overwhelmed by the complexity of information presented in websites and apps, negatively impacting their ability to complete desired tasks and find specific content (8). EyeQuant, a digital engagement & analytics company, recently released a study showing a clear correlation between 'clean, clear design' and lower bounce rates with results suggesting 'that up to one-third of a user's decision to stay or bounce comes down to a snap judgment of whether or not the page is too cluttered'. At the close of 2018, we are seeing an increased focus on minimalism in the design of these digital products & solutions to solve for this.

Minimalism at its core is not about oversimplifying an experience, rather it is about purposefully removing unnecessary elements ('design clutter') and complexity so as to allow users to focus on accomplishing specific tasks and to find/consume content with ease. Digital products that are built with a clear informational hierarchy, a purposeful use of negative space for visual breathing room, and a sensitivity towards how the proportions, positioning & appearance (color/contrast) of all onscreen elements are utilized are shown to increase the usability, desirability and accessibility of the experience.

With the core principles of user centered and accessible* design rooted in reducing visual complexity, minimalism applied appropriately in UI's should continue to maximize UX, and remain a trend that will continue to gain momentum in 2019 (and beyond).

6. ATTRACTING TALENT

Attracting and retaining top entry-level and early-career talent will be of particular concern for banks and financial services firms in 2019, forcing a re-think in compensation structures and strategies. An historically-low unemployment rate, coupled with a generational shift by millennials to value social media and internet commerce firms over investment banking, private equity and wealth management firms, has changed the playing field for financial services, exemplified by some PE firms now attempting to hire 1-2 year-experienced candidates starting salaries in the $300K range to compete with tech-centric firms such as Amazon, Google, Facebook and well-funded fintech startups. These are primarily on both coasts but, in selective cases, secondary financial and tech centers in between (**9**).

To compete with these deep-pocketed firms and their lucrative base salaries, stock option grants and relaxed work campuses and norms, financial services firms should consider somewhat radical changes to address these new hiring challenges that include:

- Varied salary and comp structures that compensate candidates with unique, high-demand education and skills (such as Financial Analysts, Data Scientists, AI, and Machine Learning Specialists and Financial Engineers) differently than lower-demand skillsets, even with limited years of experience
- Focused learning & Development perquisites for highest-rated candidates that, according to recent surveys, are considered even higher value than salary in the compensation considerations of millennials (**10**).
- Adopting more startup-oriented, entrepreneurial organizational models that emphasize smaller groups of high-performing team members with complementary skills, leveraging lean startup and 'design thinking' approaches to new product/solution delivery

Lastly, the advent of richer artificial intelligence and machine learning applications will make 2019 the year that financial services firms begin identifying new role definitions for human workers to deliver critical skills associated with AI and ML system training, both for in-house and outsourced resources. Early adopters/implementers of AI and ML systems will need to formulate strategies and revise resource and project planning cost models to accommodate these necessary skill sets, which will range from low-end, rote photo content identification tasks to mid-to-high-level language- and dialect-specific system training tasks.

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