

IMPACT OF INTERFACE DATA VISUALIZATION ON INVESTMENT DECISIONS IN DECENTRALIZED FINANCE

Ulyanov V.V.

Azerbaijan State Oil and Industry University, Baku, Azerbaijan

Keywords: decentralized financial systems, data visualization, user interface, behavioral finance, investment decisions.

Abstract. The article examines the impact of interface data visualization on investment decisions in decentralized financial systems. It investigates how the ways of displaying returns, risks and liquidity, as well as the choice of dominant metrics and interface display formats, structure the user's information space and influence user behavior. It analyzes the role of framing, visual accents, aggregated indicators and «trust signals» in the perception of protocol transparency, the level of trust in the platform and investors' willingness to expand their participation. Using the practices of major decentralized finance platforms as an example, it is shown that a deliberately designed visual environment can simultaneously reduce cognitive load, mitigate behavioral distortions and support more stable models of capital allocation between pools and protocols.

ВЛИЯНИЕ ИНТЕРФЕЙСНОЙ ВИЗУАЛИЗАЦИИ ДАННЫХ НА ИНВЕСТИЦИОННЫЕ РЕШЕНИЯ В ДЕЦЕНТРАЛИЗОВАННЫХ ФИНАНСОВЫХ СИСТЕМАХ

Ульянов В.В.

*Азербайджанский государственный университет нефти и промышленности,
Баку, Азербайджан*

Ключевые слова: децентрализованные финансовые системы, визуализация данных, пользовательский интерфейс, поведенческие финансы, инвестиционные решения.

Аннотация. В статье рассматривается влияние интерфейсной визуализации данных на инвестиционные решения в децентрализованных финансовых системах. Исследуется, как способы отображения доходности, рисков и ликвидности, а также выбор доминирующих метрик и форматов их показа в интерфейсе структурируют информационное пространство пользователя и влияют на его поведение. Анализируется роль фрейминга, визуальных акцентов, агрегированных показателей и «знаков доверия» в восприятии прозрачности протокола, уровня доверия к платформе и готовности инвесторов расширять участие. На примере практик крупных платформ демонстрируется, что осознанно спроектированная визуальная среда способна одновременно снижать когнитивную нагрузку, смягчать поведенческие искажения и поддерживать более устойчивые модели распределения капитала между пулами и протоколами.

Introduction

In the context of the rapid development of decentralized finance (DeFi), platform interfaces are becoming an important intermediary between the complex architecture of protocols and the end user. For a significant part of retail investors, access to such products is carried out through web and mobile interfaces, which not only display financial information but also structure it. As a result, it is the ways of visual presentation of data that largely determine which parameters the user will

consider significant, how informed their decisions will be, and how capital will be allocated between individual pools and protocols.

The complexity of on-chain processes, the high variability of tokenomics and the nonlinear nature of returns make primary data difficult to interpret directly. The user encounters not the initial indicators but already aggregated and visually formatted metrics. As a result, interface design ceases to be neutral and turns into a factor influencing behavioral patterns and willingness to make a decision. The aim of this study is to analyze the influence of financial information visualization on DeFi platforms on investors' behavioral patterns.

Main part. Conceptual foundations of DeFi

The set of financial services implemented on the basis of public blockchains and operating without a centralized intermediary is called **DeFi**. An important element of their infrastructure is **smart contracts**, which define the algorithms of protocol operation and automatically execute predefined conditions without the involvement of traditional financial institutions. At the user level they provide access to a number of standard financial operations, while all interactions are structured through the logic of specific protocols.

A special place in such services is occupied by **liquidity pools**. These are aggregates of funds contributed by users to smart contracts to support exchange and related operations. Income is formed from transaction fees, incentives provided through governance token rewards, yield farming programs, and other reward distribution mechanisms and therefore exhibits a dynamic nature. Its magnitude depends on the volume of liquidity, the structure of supply and demand, the volatility of underlying assets, protocol parameters and the strategies of other participants.

A fundamental feature of DeFi is the **presence of specific technological risks** associated with the architecture of smart contracts. Errors in the code, vulnerabilities in logic, incorrect functioning of price oracles and dependence on external infrastructure components create additional contours of uncertainty. At the same time, for the end user these risks often remain non-transparent, since their understanding and assessment require special technical knowledge. As a result, it is precisely the platform interface that becomes the main plane through which the investor perceives and interprets both potential returns and the set of risks encoded in the operation of the protocol.

Visualization of financial information and metrics in DeFi interfaces and its impact on investors' behavioral models

Interfaces form a specific «lens» for the user's perception of investment parameters. Research in behavioral finance shows that the format of data presentation systematically influences risk appetite, planning horizons, strategy choice and willingness to diversify, even when the numerical values themselves remain unchanged [1]. Under these conditions, the interface, which in fact serves as the main channel for interpreting complex protocol logic for a retail investor, becomes a critical link in the structure of interaction with DeFi products. Accordingly, analytical consideration is required not only for the composition and

volume of displayed parameters but also for the formats used for their visual presentation (Fig. 1).

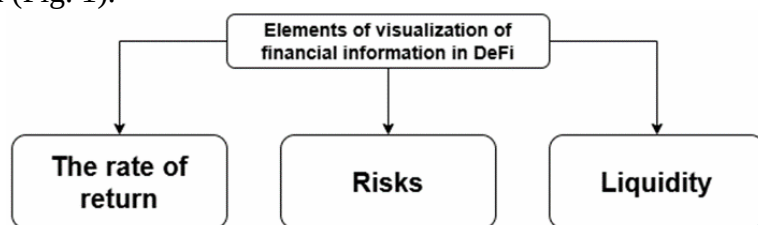


Fig. 1. Elements of financial information visualization in DeFi interfaces

One of the important elements is the **rate-of-return indicator**. The most common forms are the annual percentage rate (APR) and the effective annual yield taking into account compounding (APY). These values are, as a rule, displayed in large type, occupy the first positions in pool tables and are often accompanied by visual markers such as «top», «high yield». This configuration sets an «anchor» for the user, that is, they become the starting point for comparing all available strategies. Behavioral experiments show that under conditions of limited attention investors tend to overestimate visually dominant indicators and ignore parameters presented less prominently [2]. As a result, decisions are made mainly in the logic of maximizing the stated yield, while other parameters receive a secondary, corrective status.

Color and typographic accents also play an important role. The use of green shades for «profitable» pools, contrasting icons for «trending» strategies and specific pictograms for «popular» products strengthens the emotional component of perception. The user tends to move more quickly to products marked as «best» or «gaining popularity», even if they do not perform a detailed comparison of parameters.

The next element is **historical return and price charts**. They reflect the dynamics of the main indicators over different time horizons and formally serve as a means of assessing the stability of the strategy. However, the choice of the default interval, chart type, degree of smoothing and axis scale significantly affect interpretation. Short-term, smoothed, visually «calm» curves create a sense of predictability and stability, which increases the willingness to build up a position and increase the share of capital in a given pool. Conversely, sharply fluctuating charts, especially over long intervals, reinforce the perception of risk and stimulate avoidance strategies, even if the volatility is compensated by high long-term returns. Behavioral studies confirm that investors tend to extrapolate the visually observable trend and make decisions based on the most recent segment of dynamics rather than on the fundamental characteristics of the asset [3].

Aggregated yield indicators acquire particular importance in DeFi interfaces. They integrate the base yield of the pool, bonus rewards, yield farming incentives, loyalty programs, and the effect of automatic reinvestment into a single composite metric. Visually such indicators are usually presented as a single figure, sometimes with a brief explanation in a pop-up tooltip. From the standpoint of

cognitive load this facilitates choice, but at the same time strengthens trust in the «ready-made» numerical result. From an organizational perspective, this underlines the strategic importance of upgrading employees' qualifications in financial and management accounting, since better-trained staff are more likely to decompose aggregated yield figures into their components and critically assess the associated risks [4]. At the behavioral level this leads to an underestimation of unstable yield components that depend on short-term incentives and reward programs, and consequently to potential vulnerabilities.

In DeFi, **risk** is a multidimensional category that includes price volatility of assets, the danger of position liquidation, technological vulnerabilities of smart contracts, dependence on external oracles and other infrastructure elements. Its visualization is implemented through several types of elements (Table 1).

Tab. 1. Visualization of risk components in DeFi interfaces

Type of risk	The visualization element	What it reflects and how it is perceived
Price volatility and price ranges	Charts of volatility and price dynamics, range charts.	They show the amplitude and frequency of price fluctuations, allow you to assess the degree of instability of an asset and the sensitivity of the strategy to market shocks.
The combined level of market and positional risk	Simplified risk scales with gradations of «low», «medium», «high».	The multidimensional risk structure is reduced to a single indicator, which facilitates interpretation, but promotes reliance on crude heuristics when making decisions.
Technological and infrastructural risks	Security ratings, audit badges, and «audited» statuses.	They signal the verification of the protocol and are perceived as reliability markers, although in fact they reflect only a part of possible vulnerabilities.

Such forms of presentation translate the multidimensional structure of risk into one or two visual cues. As a rule, in such condition's users rely on rough heuristics. Consequently, a «low risk» label is perceived as sufficient grounds for increasing the volume of investments and reducing the depth of analysis, and an «audited» badge is perceived as an indicator of the practical absence of technological vulnerabilities. In reality, such markers reflect only part of the risk factors and may fail to take into account, for example, behavioral risks of the protocol, dependence on external oracles or liquidity concentration.

A separate class of elements is associated with the **visualization of liquidity**, which determines the investor's ability to enter and exit a position without significant losses. It describes the conditions for the actual implementability of investment decisions, namely the possibility of promptly buying or selling an asset, reallocating capital between pools, as well as the cost of such actions taking into

account slippage and fees. In interfaces it is usually visualized through several groups of indicators (Table 2).

Tab. 2. Approaches to visualizing liquidity parameters in DeFi interfaces [5]

The element of liquidity visualization	The form of representation in the interface	Interpretation and possible effects for the investor
Trading volumes and Total Blocked Value (TVL)	Numerical values and/or graphs for various periods.	High values are visually perceived as signs of the «depth» of the market and the stability of the pool, although by themselves they do not reveal the structure of participants and the distribution of liquidity across price ranges.
Pool depth and slippage parameters	Charts of market depth; predicted range of price deviation; configurable percentage of allowable slippage.	They inform you about how the price will change during an operation with a certain volume of an asset and about possible additional costs.
Blocking of funds and restrictions on withdrawal	Lock timers, panels with staking conditions, warning icons, text blocks describing fines and restrictions.	Contributes to the correct assessment of the liquidity profile of the strategy.

Thus, the visualization of liquidity complements the representation of returns and risks, forming an integrated, albeit interface-constructed, picture of the investment product. Owing to this, it is the interface that becomes an important filter through which the investor interprets available strategies, assesses their implementability and makes decisions on capital allocation. This filtering function is most clearly manifested in those formats of data presentation that attempt to reflect several parameters simultaneously and set for the user a structure for their comparison.

Summary tables and dashboards create a potential basis for multi-criteria choice. If the interface provides a comparable visual weight of indicators and allows you to sort and filter pools by several parameters, this contributes to more balanced decision-making and portfolio diversification. When multi-factor information is explicitly structured, users more often resort to strategies that take several criteria into account at once. However, if even in such tables yield continues to dominate visually while risk and liquidity indicators remain less prominent, the actual behavior of investors remains predominantly single parameter. Taken together, these visualization elements form an information environment in which the classic effects of behavioral finance are activated (Table 3).

Tab. 3. Effects of behavioral finance in the environment of DeFi interfaces [6]

The effect of behavioral finance	Definition	A brief description in the context of DeFi interfaces
Framing	Defining the framework of interpretation through dominant metrics.	The interface visually makes the basic indicators basic, so the user evaluates all other parameters through the prism of these indicators.
Anchoring	Relying on the first seen values of profitability.	The first shown values of APR/APY or «top» pools become the starting point of comparison, to which all other options are then unconsciously «linked».
Limited attention	Shifting the focus to visually highlighted indicators.	Large print, color, and icons focus on profitability and «top-end» products, while risk and liquidity remain on the periphery of perception.
Herd behavior	Following the «popular» pools.	Popularity markers, user counters, and «trending» badges encourage investors to focus on strategies already chosen by most.
Excessive trust in aggregated and rating estimates	Trust in integral indicators and ratings as final estimates.	Aggregated metrics of profitability and risk, ratings and audit badges are perceived as a professional result of the analysis and replace the self-assessment of the product.

Thus, the visualization of financial information in DeFi interfaces acts not as a neutral channel but as a significant factor shaping investor behavior. The way returns, risks and liquidity are displayed, the choice of dominant metrics and their visual highlighting reinforce reliance on simplified cognitive strategies, a focus on short-term returns and following «popular» pools while underestimating hidden risks. At the same time, coherent and user-friendly visual design contributes to the formation of the platform's brand as transparent, reliable and technologically advanced, which further increases investors' readiness to trust the interface and the organization behind it [7]. As a result, the interface becomes an element of the financial architecture that influences capital allocation and risk concentration in the DeFi ecosystem, which requires that behavioral effects be taken into account when designing visual solutions.

Visualization, transparency and trust in DeFi platforms

The mechanisms by which visualization influences investors' behavioral models show that the interface shapes the user's overall attitude toward the platform as a more or less reliable and understandable system. At this level, the visual presentation of data begins to perform the function not only of an informational, but

also of an institutional intermediary, influencing the perception of the transparency of on-chain processes, the level of trust in the protocol, and the investor's willingness to increase the volume and time horizon of participation.

It is indicative that major USA players working with on-chain instruments are forced to deliberately build visualization precisely as a "window of transparency". For example, in the **Aave** interface, available through the applications of large crypto brokers, the yield rate on the asset, the amount of collateral, the health factor of the position and the liquidation threshold are displayed on a single screen, so the user explicitly sees under which parameters their loan moves into the zone of liquidation risk [8].

Transparency in this context is formed not only through the provision of numerical values, but also through explaining the logic of their changes. If the interface reflects not only current values but also the sequence of on-chain events, the user gains the opportunity to reconstruct cause-and-effect relationships and better understand the consequences of their actions. The more coherently and consistently these elements are presented, the higher the subjective sense of transparency. In the opposite situation, an image of a «black box» is formed, which reduces confidence and hinders long-term participation.

In addition to basic quantitative indicators, DeFi platform interfaces widely use elements that can be described as trust signals. These include smart contract audit badges, indicators of having passed security checks, protocol ratings from external analytical services, marks of partnerships with well-known projects, as well as visual links to public reports and documentation. Integrated into the interface, such elements function as concise signals of the platform's recognition and reliability.

A separate example is the **Uniswap** interface, developed by the American company Uniswap Labs. When performing a swap in real time, the user's visual displays the expected impact on the price and the minimum number of tokens that the user will receive, taking into account the specified allowable slippage. When certain threshold values are exceeded, the system displays warnings about an «abnormally high» impact of the trade on the price and suggests reconsidering the trade size or slippage parameters [9]. As a result, the visualization shows not only the final price but also the mechanism of its formation, allowing the investor to assess the hidden cost of liquidity and make a more informed decision.

From the user's point of view, such signals reduce the complexity of evaluation. The need for independent analysis of code, audit reports and incident history is replaced by a ready-made visual conclusion. The presence of several mutually consistent indicators creates a cumulative effect and strengthens the subjective sense of security. At the same time, the placement and form of presentation play an important role [10].

Visual metrics play a noticeable role in the formation of trust, since they demonstrate the stability of the protocol over time. Stable liquidity volumes, the absence of sharp drawdowns in returns, and predictable fees are perceived as indirect confirmation of reliability. However, without explanations and context,

such indicators can create an illusion of stability and conceal significant risks, so trust signals both facilitate orientation and are capable of masking the ambiguity of the environment.

An important factor is the quality of data presentation in the interface: a clear structure, logical coherence, sufficient but not excessive detail, and consistency of visual elements. If indicators of returns, risks and liquidity are organized in such a way that the investor quickly gains an integral view of the product and unambiguously interprets the data, cognitive costs decrease and the willingness to carry out and repeat transactions increases. Conversely, fragmentary or contradictory information amplifies uncertainty, slows down decision-making and reduces trust, prompting users to reduce investments and switch to simpler, albeit less profitable, instruments.

Thus, the quality of interface visualization acts as one of the central factors linking the transparency of on-chain processes, subjective trust in the DeFi platform and the actual intensity of investment activity [11]. The more consistently and clearly the presentation of data is organized for the user, the higher the likelihood that the platform will be perceived as a reliable and convenient environment for the long-term placement of capital (Fig. 2).

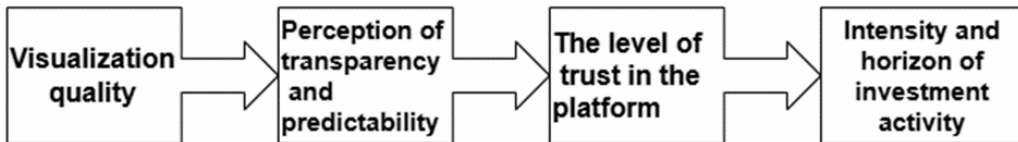


Fig. 2. Relationship between visualization quality, trust in the platform and investment activity

Interface solutions in DeFi platforms should be regarded not only as a matter of user convenience but also as a significant element of the financial risk architecture. To form sustainable models of investor participation, it is necessary to deliberately design a visual environment that minimizes perceptual distortions and supports informed decision-making.

Conclusion

In modern digital financial ecosystems, the visual representation of data acts as one of the main mechanisms shaping investment behavior. Using DeFi platforms as the empirical basis, it is shown that interface visualization of returns, risks and liquidity defines for the investor a specific information space in which the relative weight of individual metrics changes and the structure of choice is configured. Framing, visual accents, aggregated indicators and «trust signals» create a frame for interpreting products, shifting the balance between the perception of potential gain and the consideration of associated threats. As a result, the interface ceases to be a neutral channel of access to on-chain processes and becomes an element of the decision architecture that influences the choice of strategies, the level of accepted risk and the allocation of capital between pools and protocols.

At the same time, the analysis of practices implemented in the products of major USA companies shows that the interface can serve as a tool for enhancing transparency and trust, provided that visualization links metrics with an explanation

of the mechanisms of their formation, limitations and risks. The combination of clear indicators, consistent terminology, disclosure of the logic of on-chain operations and balanced use of trust signals helps to reduce cognitive load, accelerate decision-making and support more sustainable models of investor participation. This makes it possible to conclude that the further development of DeFi platforms should include not only improvements at the protocol level but also the formation of responsible standards for interface visualization aimed at information transparency, mitigation of behavioral distortions and the maintenance of long-term user engagement.

References / Список литературы

1. Eberhard K. The effects of visualization on judgment and decision-making: a systematic literature review // *Management Review Quarterly*. 2023, vol. 73, no. 1, pp. 167-214.
2. Parashar N., Sharma R., Sandhya S., Joshi A. Market Volatility vs. Economic Growth: The Role of Cognitive Bias // *Journal of Risk and Financial Management*. 2024, vol. 17, no. 11, p. 479.
3. Putri A., Tanno A. Exploring market dynamics: A qualitative study on asset price behavior, market efficiency, and information role in investment decisions in the capital market // *Atestasi: Jurnal Ilmiah Akuntansi*. 2024, vol. 7, no. 2, pp. 810-827.
4. Mussina Z. Strategic impact of employee upskilling in financial and management accounting on business performance // *Cold Science*. 2025, no. 22, pp. 31-40.
5. Adamyk B. Risk management in DeFi: Analyses of the innovative tools and platforms for tracking DeFi transactions // *Journal of Risk and Financial Management*. 2025, vol. 18, no. 1, p. 38.
6. Bodo B., De Filippi P. Trust in context: the impact of regulation on blockchain and DeFi // *Regulation & Governance*. 2025, vol. 19, no. 3, pp. 740-760.
7. Mudrov M. Formation of a personal brand in the digital environment as a strategic resource for business development // *Journal of Economics, Finance and Management Studies*. 2025, vol. 8(11), pp. 7383-7389.
8. Green A.M., Giannattasio M.P., Erickson J.S., Seneviratne O., Bennett K.P. Defi survival analysis: Insights into the emerging decentralized financial ecosystem // *Distributed Ledger Technologies: Research and Practice*. 2024, vol. 3, no. 1, p. 1-23.
9. Yen C. Towards Enhanced User Experience in Decentralized Exchanges: Analyzing the Impact of Dynamically Determined Slippage Protection on Trader Strategies // *SSRN Electronic Journal*. 2024, pp. 1-5.
10. Nuzhdin D. Architecture, UX, and personalization algorithms of digital platforms for personal branding and business communications // *International Journal of Engineering in Computer Science*. 2025, vol. 7(2B), pp. 180-185.
11. Berezhnoy A. Architectural design patterns for high-load systems: principles, tools, and scalability constraints // *Professional Bulletin. Information Technology and Security*. 2025, no. 3/2025, pp. 33-39.

Ульянов Владимир Владимирович – бакалавр	Ulyanov Vladimir Vladimirovich – bachelor's degree
uliankin.vlad@yandex.ru	

Received 05.12.2025