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CONTROLLING YOUR OWN STORY USING A DIGITAL IDENTITY SOLUTION: CREATION OF ECONOMIC IDENTITY FOR FINANCIAL INCLUSION AND PROTECTION

Research in Progress

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Abstract

An economic identity that we take for granted in many developed countries is often elusive for large segments of the population who are at risks or under political oppression. These segments are often physically located in geographical jurisdiction that are politically unstable and are not connected to conventional banking infrastructure and have little means to access or afford financial services that some of us take for granted. Therefore, in this research proposal, we posit that the starting point of activating one's digital identity and the subsequent creation of an economy identity is the proper management of the elements of their life stories associated with their identity. We are thus interested in exploring the design principles underlying a digital identity solution (DIS) built on a decentralized blockchain that would bestow upon the individual the affordances to curate, manage, and formulate their life stories through the mechanisms of the narrative persuasion theory for an optimal economic identity.

Keywords: Digital Identity, Economic Identity, Decentralized Identity, Blockchain, Trust, Design Principles

1 Introduction

Innovations in distributed technology such as cryptocurrencies and blockchain have given rise to a rethink of many aspects of how we manage our society and economy (Catalini and Gans, 2016). In particular, one of the more lofty ideas in the cryptocurrencies and blockchain space has been one about banking the unbanked or giving the most at-risk segments of the world population (Larios-Hernández, 2017) an economic identity. Essentially, the premise of this idea is based on the evidence that unlike the segments of the population that are born in countries that have easy access to stable and conventional banking infrastructure and affordable financial services, these at-risk segments are physically located in geographical jurisdiction that are politically unstable and are not connected to conventional banking infrastructure and have little means to access or afford financial services that some of us take for granted (Schuetz and Venkatesh 2020).

Similarly, we have all seen the horrors that played out in the media during the last few days of when the U.S. military hastily pulled out of Afghanistan. Throngs of Afghans desperate to leave their home before the Taliban swept into Kabul. Afghans who managed to leave the country in military planes are now refugees in another country (Stempel and Alemi, 2020), faced with the uncertainty of having to start life afresh¹. Similarly people who came out of the wrong side of a genetic lottery and are born in countries with substantial political and social instability often find themselves at the mercy of circumstances and sucked into poverty without the means to access basic financial services such as low interest credits or to hedge against risks of nature. For many of these individuals, it is often a cycle of taking one step forward and then ten steps backward (Slewa-Younan et al., 2017).

There have been indications and evidence that correlate such access and ability to afford these financial instruments to other metrics that often serve as indicators of a higher quality of life. Does it mean, based on the above premise, that we should simply accept that the game of life is one of a genetic lottery and that those who are born in geographical jurisdictions that are not properly financially serviced are doomed to be exploited by those who are?

One of the cornerstones towards taking the first step in banking the unbanked has been touted as the need to provide a technological artifact (Abujarour et al., 2021) known as a digital identity or more specifically, a Decentralized Identity (DID) (Dunphy and Petitcolas, 2018) to individuals born in such jurisdictions. The DID would serve as the bedrock upon which these individuals could build their economic identities. The concept of the DID is deeply connected to the context of individuals in such an environment with characteristics that work against them: Political instability, lack of formal documentation by trusted institutions, no proper way to keep track of educational and professional credentials, access to credit is expensive and associated with violence and intimidation, transactions and store of wealth are largely in cash². Therefore, the use of a DID to anchor an individual who live in such an environment is appropriate due to its existence on a public infrastructure such as a blockchain that is transparent, immutable, uncensorable, auditable, and time-stamped (Kewell et al., 2017). Such a digital artifact insulates the individual from political instability and the lack of formal documentation or poor record keeping (Devlin, 2009). It means that whenever there is a regime change or a civil war, paper or computer records of the identity of the individual, which could be easily destroyed, could now be preserved on the blockchain. With the assurance of permanence, the individual would then be free to anchor their entire life history and curate a story of themselves that would serve them in their best interests (Allen 2016).

The starting point of activating one's digital identity and the subsequent creation of an economy identity is the proper management of an individual's DID (Avellaneda et al., 2019) and elements of their life stories associated with the DID. In this research, we are thus interested in exploring the design principles (Benyon, and Murray, 1993) underlying a digital identity solution (DIS) that would bestow upon the

¹ <https://www.unhcr.org/en-au/afghanistan.html>

² <https://finca.org/blogs/what-is-financial-exclusion/>

individual the affordances to curate, manage, and formulate their life stories through the mechanisms of the narrative persuasion theory (Bilandzic and Busselle 2013) for an optimal economic identity.

Of course, the postulations contained in this research is based on the premise that the underlying DID infrastructure is already in place and that a nation's existing institutions have their DIDs in place and are already deploying verifiable credentials. Without the bedrock of the infrastructure and business process in place serving as the root of trust, our research would be moot because there would be no foundational evidence upon which concepts of trust could be derived to support the story of the individual's economic and financial identity.

Theoretically, the contribution of this research-in-progress proposes a novel synthesis of elements of story-telling with the well-established framework of the dimensions of trust as the foundation upon which we can carry out a qualitative research to uncover potential design principles of a DIS (Abujarour et al., 2021). Practically, we postulate that for individuals in such a context to utilize the DIS to create a digital identity and specifically an economic identity, they have to be afforded functionalities by the DIS that will correspond to specific elements of a complete story that can create an economically viable level of credibility for the individual to secure financial services from the global market. Essentially, our research addresses the knowledge gap of the current lack of a contextualized theoretical framework associated with the design of a DIS that puts the individual at the front and centre of their digital identity that will allow them to gain an economic identity.

To address the abovementioned knowledge gaps, we will collaborate with a leading company in the business of providing digital credentials and will work with them through a qualitative research methodology to elucidate the design principles of a DIS that will correspond with our theoretical framework for building a credible economic identity for underbanked individuals from less developed regions.

2 Theoretical Foundation

2.1 Research Context – Financial Inclusion

Based on the data published by the World Bank in 2018³, 1.7 billion people did not have bank accounts in 2017, and while one billion adults still choose to use cash to pay utility bills. While there is a race towards increasing the level of financial inclusion, the advent of the distributed technology such as cryptocurrencies and blockchains has raised the question of the existence of blindspots in such a process. It is easy to point out that such a drive towards simply extending such financial services towards the individuals in traditionally lesser developed region would put the narrative in the hands of traditionally powerful financial institutions of how such individuals are evaluated to be granted access to financial services. In other words, these individuals would still be at the mercy of these institutions who still hold all the cards in picking winners and losers in these economies (Gloukoviezzoff, 2007). This effect would be further exacerbated for individuals who do not possess conventional documentations that would be deemed credible from the perspectives of the traditional financial institutions'. It would create a heavy burden on individuals to prove their credit worthiness for investment (Ledgerwood and White, (2006).

From this premise, our research is centred in our attempt to return the power of the narrative back to the individuals and providing them the freedom to go beyond the boundaries of traditional financial institutions. A decentralized open infrastructure like the blockchain is perfect to shelter disadvantaged segments of the population who are normally situated in regions rife with economic and political upheavals. For example, there are still many parts of Africa that are facing civil wars like in Ethiopia which is the second most populous country in Africa (Walsh and Dahir 2022). In regions such as

³ <https://www.worldbank.org/en/news/press-release/2018/04/19/financial-inclusion-on-the-rise-but-gaps-remain-global-findex-database-shows>

Ethiopia, regime change often means old records are erased or destroyed and citizens in such regions can easily lose their economic identity in such events.

At the crux of this research, we posit that the principal digital artifact that will allow for individuals to control their narratives for the creation of a credible economic identity lies with a well-designed DIS. We postulate that the design of the DIS should be based on the ability of the individual to piece together the fundamental elements of a story related to the individual in any chosen situations. The design of the DIS would relate to the dimensions of trust and the subsequent creation of a trustworthy economic identity that would allow an individual to access liquidity to entities beyond traditional financial institutions (Johnson et al., 2010). The recognition in this research is that the creation of a trustworthy economic identity need not be restricted to the whims and demands of a narrow channel of traditional players with blinders about how they view the system of the world. We posit that access to liquidity and financial services could have a broader appeal beyond the boundaries of traditional financial institutions to include individual players with excess liquidity looking for sound investments globally.

2.2 Decentralized Identity and a Digital Identity Solution

The concept of the DID is based on the blockchain as the underlying infrastructure which is a form of distributed ledger technology. Blockchain is a timestamped chain of blocks collectively maintained by every participating node (Liu et al., 2017) and is thus an open infrastructure where anyone is welcomed to participate. In general, there is no one single entity that controls the blockchain which is secured through cryptography a consensus mechanism (Zhang et al., 2019). The DID, as a record on the blockchain, is represented by three basic components: 1) the individual holder, 2) the issuers of digital credentials, and 3) the verifier. The entire process flowing across these three entities are founded on the utilization of the public-private key pairs that are very common in cryptocurrencies (Brunner et al. 2020). The individual holder denotes a pointer on the blockchain represented by their public key. This pointer is public and can be broadcasted publicly and globally as representative of the individual holder. The individual holder keeps their private key secret in a local device or in their memory and will never reveal it to anyone. Over time, the individual holder would accumulate pieces of information going about their daily activities known as digital credentials. Digital credentials can take the form of driver's licenses, education certificates, criminal records, passports etc and they are issued by the relevant authorities who have also registered their individual public keys on the blockchain as a public pointer that are broadcasted publicly while also keeping their private keys safe in a local device or in their memory (Brunner et al., 2019).

When a digital credential is issued by the issuer to an individual, they are signed with the digital signatures created by the issuers and the credentials are then stored by the individual. The final component of the DID is the verifier. These verifiers can take the form of organizations or other individuals with whom the individual holder interact. The verifiers can request specific information associated with the digital credentials held by the individual holders in order for transactions or the render of services to occur (Brunner et al. 2020). When handling over this information, the individual holder would add their own digital signature to this information to authenticate it. In summary, the verifier will be able to use the two digital signatures (one from the issuer plus the other from the individual holder) associated with the requested piece of information and validate them with the respective public keys publicized on the blockchain by both the issuer and the individual holder (Brunner et al. 2020). In the entire process, the digital signatures are specific to the particular instance of information transfer and can not be replicated by anyone who do not possess the respective private keys, thus preserving the authority of the individual holder to have sovereignty over their own privacy (Allen 2016). At the fundamental level, a DIS has to allow for the seamless flow of this process involving the interplay of these three players.

As the blockchain technology and distributed ledger gained prominence, the concept of the DIDs has also gained similar attention mainly the following areas. First, in the most natural use case for DIDs and verifiable credentials was in utilizing them as a decentralized and lightweight alternative (Reed et al. 2019; Sovrin 2018) to established authentication methods that involved centralization and custodial information. Second, much of the research in DIDs involves engineering solutions towards their

application in different contexts such as Internet of Things (IoT) (Ansey et al. 2019), smartphones (Omar et al, 2020), or in vaccination passports (Halpin, 2020). The third stream of research involving DIDs revolves around backend optimization such as the use of cloud (Zhong et al. 2021) and the addition of fragmented signatures (Othman 2018). From the review of this extant research on DIDs, there is clearly a focus on enhancing the engineering use cases and challenges in the scheme of the DIS. It is thus timely for our research to move the focus in DIS to touch on front end design principles that would enhance the usability and utility from the user's side of the DIS. Our research goes beyond this engineering focus in proposing design principles that will allow individual holders to create and the presentation of a narrative about themselves to create a trustworthy economic identity. Therefore, in the next section, we delve into literature on trust to synthesize dimensions of trusts with essentially dimensions of stories in proposing a theoretical framework from which such design principles could emerge.

2.3 Trust and Trustworthiness

In literature trust has been defined as, “a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another” (Rousseau et al. 1998, p. 395). The definition is appropriate for this research context if we posit that the purpose of creating an economic identity to go beyond the rules set by traditional financial institutions to facilitate peer to peer microfinancing. One should be clear that the advocacy in this research is not about trying to force the existing highly-regulated banking institutions to accept a different set of criteria to evaluate their clients' credit worthiness. Rather, it is about the preservation of records and information that are immutable and auditable through a conceptual-based DIS as the root of trust to serve as the elements from which an individual could craft their own financial narrative in the best possible light to overcome the barriers in current financial paradigm from which the unbanked are currently excluded. This is because: (1) the interests of one party is dependent upon another and (2) trust is not required if the expected outcome does not involve certain level of risk. Essentially, trust is the underlying psychological condition of risk-taking behavior (Chen and Dhillon 2003; Das and Teng 2004; McKnight et al. 2002a). In this research, while the backend of the DID and verifiable credential infrastructure could ensure authenticity of information, the front-end challenge is still a fragmentation of information that would require a structured way of presentation that induce trust perceptions from the verifiers.

From past research, Mayer et al. (1995) put forward that a trustee's characteristics and actions dictate their trustworthiness, which in the case of our research is anchored on the individual holder. Accordingly, individual holder should accentuated three trustworthiness qualities the core prerequisites that foster trust: ability, benevolence, and integrity. Ability refers to the individual holder's capability or competence to fulfil the desired actions. Benevolence refers to the individual holder's goodwill and perceived motivation to act on the trustor's (in this case, the investor's or the credit provider's) behalf. Integrity is a reference to the individual holder's willingness to commit to a set of agreements, such as being honest, fair, and responsible (Mayer et al. 1995; Park et al. 2012). Mayer et al. (1995)'s seminar work on of trustworthiness has been applied and documented in various technologically mediated research contexts, such as e-commerce (McKnight et al. 2002b; Park et al. 2012; Urban et al. 2009), and technology adoption (Hwang 2009; Yousafzai et al. 2005).

2.4 Narrative Persuasion Theory

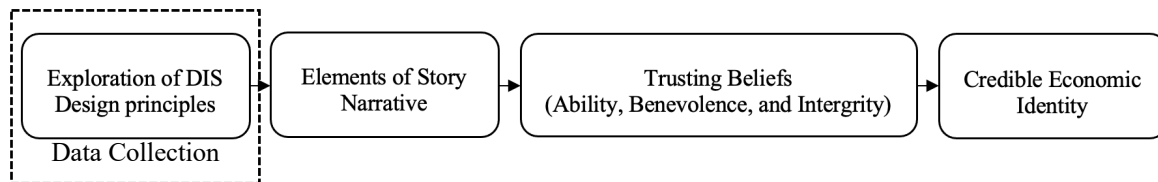
To build a credible economic identity, we believe that the design of the DIS has to make allowance for individuals to control their narratives. In other words, the individual holders are the narrators and generators of their own narratives. To afford individual holder the capacity to piece together a persuasive story related to any chosen situation, we draw from the narrative persuasion theory to guide our attempt to articulate principles to design a viable DIS.

From literature, we came to define narrative persuasion as the consequence of having one's beliefs, attitudes, or actions shaped by a narrative (Bilandzic and Busselle 2013). Narrative persuasion is contrasted with conventional argumentative persuasion that often works through the mechanism of logic

and rationality and are focused on reasoning that are supported with facts and evidence (Moyer-gusé and Dale 2017). By contrast, narrative persuasion has an emphasis on how the story is told to convince the verifier of the narrative message to immerse and enter the story and walk the steps as the narrator has laid (Bilandzic and Busselle 2013). In other words, the effectiveness is the melding of the minds between the narrators’ and the verifiers’ of the narratives.

There are three components in a story narrative: character, events, and plot (Green et al. 2004). They are key elements in order for the narrator, in our case, the individual holder, to formulate a persuasive narrative messages (van Laer et al. 2014) to build a credible economic identity, which we will elaborate here: The central anchor of every story is the character of the individual holder. As the anchor of the economic identity to be build on the DIS, detailed and trusted information about the individual holder has to clearly define their attributes. If the individual holder could display their character to be more readily identified by the verifier, it would more easily translate to trusting beliefs (Moyer-gusé and Dale 2017). Next, a character in a story, as they interact with the elements of daily activities, are defined by events. In other words, events are the incidents about what happened to the character and they are the building blocks to construct the story. These events provide the platform on which verifiers could carry out the construction of the story events in their own minds allowing them to immerse in the story world (van Laer et al. 2014). Lastly, the plot refers to the chronology of the events that allows for the inference of their causality. Essentially, the chronology of events provides auditability to the story by the verifier.

Literature suggests that it is important to consider the narrative structure, sentiment, and story richness in narrative persuasion and how they impact each of the story components (Egidi and Gerrig 2009). Which information details to provide and how they are provided will offer different levels of ease with which verifiers can buy into the narrative and inspire them into action (Green et al. 2004). Therefore, we believe the utilization of the narrative persuasion theory and its components as the theoretical perspective upon which we, through a case study of a digital credential company, explore and research design principles of the DIS for individual holders to build a credible economic identity. We summarize the logic of our proposed research as follows:



3 Research Plan and Methodology

Given the exploratory nature of our research, into a still relatively understudied phenomenon – decentralised identity and role of technology – a case study data collection methodology is especially appropriate (Siggelkow, 2007; Walsham, 2006). We adopt a qualitative approach with a largely interpretive stance (Klein and Myers 1999). For the case study we believe that the relevant and revelatory context for addressing our research question would be the development of digital identity solution for financial inclusion and protection process. In this study we will collaborate with a leading company in digital identity development with the objective of developing providing highly fluid and interoperable digital credentials. Per the designed-in flexibility of interpretivist research, we recognise that the interview questions are likely to change with the progression of the research (Gioia et al., 2013).

In selecting an appropriate case organization that are in the business or providing a DIS, we will filter out organizations that are private entities that seek to centralize and consolidate their members’ information. We do not however eliminate organizations that currently possess a centralized philosophy but have articulated a clear road map towards decentralizing their user’s data and advocate for self-custody of their private information. The other criteria for case selection is that the organization should already have an existing backend DID infrastructure in place to eliminate distractions from matters related to backend optimization so that we can wholly focus on understanding the issues related to the

front-end design of the DIS. However, in the worst-case scenario that we are not able to secure an appropriate case organization, we will explore the use of the design science approach (Hevner et al. 2004) towards a rigorous derivation of the IT artifact in the DIS.

We will employ purposeful sampling to support a relevant, information-rich empirical setting and select suitable informants. At the heart of our study are semi-structure interviews with key informants from organizations and their ecosystem in order to obtain both retrospective and real-time accounts of their experience with their road map towards a digital identity solution and the adoption of digital credentials by various stakeholders for inclusion and protection. The requirement for fluidity and interoperable digital credentials to enable the formulation of a compelling narrative to achieve persuasion should form the basis of informing us about how the digital identity solution could be designed for more generic scenarios. In this way, we seek to adhere to the rigour of a qualitative study while still retaining revelatory potential for informed theory on decentralised identity and role of technology (Tracy, 2010; Gioia et al. 2013).

Data collection will be conducted from two main sources: 1) We planned for and conducted interviews through fieldwork from late 2021 to early 2022. We will approach and identify directors, senior managers, development officers, and other key stakeholders of digital identity solution; and 2) online documents pertaining to digital identity. Data analysis will be performed concurrently with data collection to compare the initial findings of the case against the initial statements and the theoretical lens. The collection of data from two separate sources allows us to make comparison between what the case organization is doing and other possible trends in the domain of DIS. Any discrepancies could then be raised in our follow up interviews with the case organization to determine the reason behind deviations. Such method should increase the richness of our conceptual understanding in the design of the DIS for the purpose of story telling. We seek to discover patterns and develop further mappings of the coded responses by sifting through the empirical interview data, theoretical perspectives, and relevant literature to explain decentralized identity and the role of technology.

In the planned data analysis, we will develop a data structure (Gioia et al., 2013) which will represent a graphic representation of how we progressed from raw data to concepts and themes, demonstrating rigor through interactive coding in this qualitative research and inductive study. The data will be organised and coded using the grounded theory techniques of open, axial, and selective coding (Strauss & Corbin, 1990) to reduce the data to manageable categories and identify recurring themes. When confronted with data that challenged or did not fit easily into existing themes or dimensions, the coding scheme would be modified accordingly (i.e. add a new, or modify/delete an existing, second-order theme or aggregate dimension; see Strauss and Corbin, 1990), and coding would be restarted. By 'recursively iterating between (and thus constantly comparing) theory and data' (Eisenhardt and Graebner, 2007) in this way, the theory will be inductively derived and gradually shaped. This process continued until the state of theoretical saturation was reached (Glaser and Strauss, 1968), which refers to the state where the inductively derived model can comprehensively account for the case data, and incremental learning is minimal as we are observing phenomena seen before (Eisenhardt, 1989).

4 Expected Contributions to Theory and Practice

Founded on the desire to provide individuals, most at risk of social and political displacement, credible economic identity, this study postulates that the essential artifact that could jumpstart this process is to research on the design of a DIS to manage the individual's DID. In this proposal, we posited that one of the most salient features in such a DIS that will allow the individual to achieve the goal of building a credible economic identity (Avellaneda et al., 2019), would be their ability to narrate and tell a story underlying different situations in their lives.

Motivated by this premise, we first proposed a novel theoretical synthesis for this particular context of a DIS and the creation of an individual's economic identity whereby we combine theories of narrative persuasion with well-established dimensions of trusting beliefs and their subsequent influence on the individual's credibility. Specifically, at the high level, we are postulating that the different components of an individual's story narrative: the character, the plot, and the events, could have specific effects on the different trusting beliefs of ability, benevolent, and integrity. In this particular research proposal,

while we have only synthesized the two major theoretical frameworks at an abstract level as our initial theoretical contribution that is specific to this research context, we acknowledged that more detailed explanation of the relationships across the dimensions of story narrative and the trusting beliefs would have to be articulated in subsequent versions of the research. Regardless, the contribution to theory lies with the connection between design principles with concepts of narrative persuasion and the articulation and mechanisms by which they could affect trust beliefs. Our contribution would be contextualized to the phenomenon of DIS with focus on the capability for building a financial and economic identity.

Practically, as the idea of realizing self-sovereign identity for an individual through the utilization of a technological artifact of a DIS is still in its infancy, there is a clear lack of imagination as to how the DIS should be designed for optimal results. Therefore, this research aims to fill this practical knowledge gap through conducting a case study of a digital credentials company to articulate design principles (Benyon, and Murray, 1993) for a DIS that will allow individuals who might belong to a vulnerable and at-risk segments of our population (Slewa-Younan et al., 2017) to build credible economic identities and subsequently participate in global economic activities.

In doing so, this research represents the starting point of which we rethink about what is actually means by empowering individuals belonging to at-risk segments of our population. It brings attention to how we could refocus our effort by putting the tools and responsibilities back to these individuals in charting out their own destinies (Abujarour et al., 2021). Such an approach differs from popular past efforts in tackling the issue of poverty through different permutations of methods that originate from the same perspective of concentration of power within central entities to lead and to act on these individuals' behalves. Having said that, while the study has focused heavily on tackling challenges that are facing at-risk segments of our population, it is not to say that the results from this study of DIS are not relevant to individuals who do not belong to such segments of our population. Similarly, a well-designed DIS solution is extremely useful for **privileged** individuals to create and craft the narrative that would best present their interest to the world similar to the premise of self-sovereign identity (Allen 2016). Instead of relying on templated forms that allows centralized entities to form their arbitrary evaluation over individuals when rendering their financial services, the DIS flips the scripts in allowing such individuals to prevent leakages of non relevant information about themselves (Sovrin 2018) that could incur unexpected economic costs in the future when accessing financial services.

5 Direction of Study and Limitations

As alluded to earlier, in the extension of the above proposal for a full study, more elaborate conceptualization has to be carried out to articulate how the dimensions of a story narrative (Bilandzic and Busselle 2013) are connected to the dimensions of trusting beliefs (Mayer et al., 1995). For instance, does the plot of a story narrative without the proper presentation of the character and the details of the events only affect the perceived ability of the individual and not their perceived benevolence, and perceived integrity? Such conceptualizations would have to be presented in future iterations of the manuscript. In addition, we foresee that there will be a necessity to expand our data collection beyond working with only one digital credential company. There is likely to be a necessity to work with other parties like the users of the actual DIS and as well as with common verifiers such as employers or service providers that commonly would require the verification of credentials to understand the challenges in interpreting the story narrative presented through the DIS.

Lastly, there are no doubts that approaching the objective of trying to allow at-risk individuals to create their economic identity from a technological artifact perspective is only one piece of of the entire jigsaw. To complete the picture other studies would have to approach the objective from other angles such as those from policy and regulations, protocol standardization, and global coordination. Studies into this areas should also be carried out to complement the technological solution in order for a holistic DIS to emerge that would be consequential for individuals who need them most.

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