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# Digital archetypes: a tool for understanding personality characteristics in the digital culture

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In different organizational areas, the theories and tools of archetypes have been very important to know the interests, strengths and weaknesses of each member of the work teams, as well as the main aspects to be considered to develop their greatest potential. Organizational culture, known as the set of beliefs, behaviors, values and collective practices that characterize a group of collaborators of the same organization, is based on the combination of these individual personalities. For this reason, when managing teams to execute and implement digital projects, it is important to consider the archetypes and digital profiles that allow to identify the basis of the digital culture of the organization. In this article, a theoretical basis is presented to propose a model of digital archetypes based on previously developed archetype theories. Two personality axes are proposed in order to define 4 archetypes that combine and form 8 digital personality profiles. A case study is presented in which the identification of the digital profiles of members of a work team allowed the definition of change management strategies to enhance the results of the work team. This work looks forward to proposing a specific definition of the factors to consider in generating concrete and valid resources for the identification of archetypes and digital profiles.

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## Introduction

Organizational culture is commonly defined as the amalgamation of beliefs, behaviors, values, and shared practices that enable a group of collaborators to align their efforts toward a common goal and contribute to the achievement of their respective entities' objectives (Grover et al., 2022; Kawiana et al., 2018). It can be likened to the collective personality of an organization, as emphasized by several scholars (Aydogmus et al., 2018; Bokhari and Aftab, 2022; Parent and Lovelace, 2018). Notably, some authors underscore the significance of fostering organizational culture as an integral part of continually enhancing employee performance (Nurlina, 2022; Widarko and Anwarodin, 2022).

In this context, an organization's digital culture encompasses the collective set of beliefs, behaviors, values, and practices that evolve within the organization, driven by the significance of information and communication technologies along with other digital assets (Saad, 2018; Sastre et al., 2019). The cultivation of a desired culture within an organization is attainable through a structured methodology and disciplined endeavors (Hemerling et al., 2018; Westerman et al., 2019).

Certain individuals demonstrate a higher aptitude for embracing emerging technologies, a better comprehension of novel models of social interaction rooted in digitization, active participation in projects, and a greater capacity to navigate the uncertainty arising from the rapid pace of contemporary change. They exhibit autonomy and proactivity, effectively managing themselves through digital mediums, all while maintaining a notably high level of trust in digital reliability.

Conversely, some individuals face considerable challenges when deprived of human interaction and must engage with technologies such as robots, chatbots, various online platforms, the metaverse, virtual and augmented reality, drones, and other tools. For them, working comfortably in environments characterized by an uncertain and rapidly evolving future, the prevailing volatility of today's world, and the inherent ambiguity of decision-making can be especially challenging (Putro et al., 2022; Taskan et al., 2022).

Drawing from personality theories, archetypes, and styles, a conceptual model has been constructed (Arnau, 1990) with the potential for mathematical formalization within the framework of modern psychometric theory concerning latent variables (Borsboom, 2005). This model has been adapted to be operationalized not only as dimensional variables (profiles) but also as typologies (categories), a critical aspect for informed diagnostic decision-making (Goldberg, 2000). Such an approach aids in the identification of behavioral inclinations in response to change, digitization, and project execution, enhancing our ability to comprehend and manage these complex dynamics.

Building upon advancements in collective intelligence (Mulgan, 2017), the primary aim of this study is to establish a conceptual foundation for the development of a psychometric model. This model is designed to enable the identification of digital archetypes, thereby facilitating the creation of well-balanced teams for innovation, optimization, and digitization efforts. Furthermore, it has the potential to enhance communication and teamwork by leveraging the distinctive qualities associated with each archetype.

## Personality archetypes: description, formalization and validity of its measurement: DISC case

Since ancient Greek philosophers' times, Plato had the idea of building archetypes and in this exercise, he gave the guidelines of what today is known as personality styles. These styles are a set of qualities attributed to the behavioral tendency of people, which

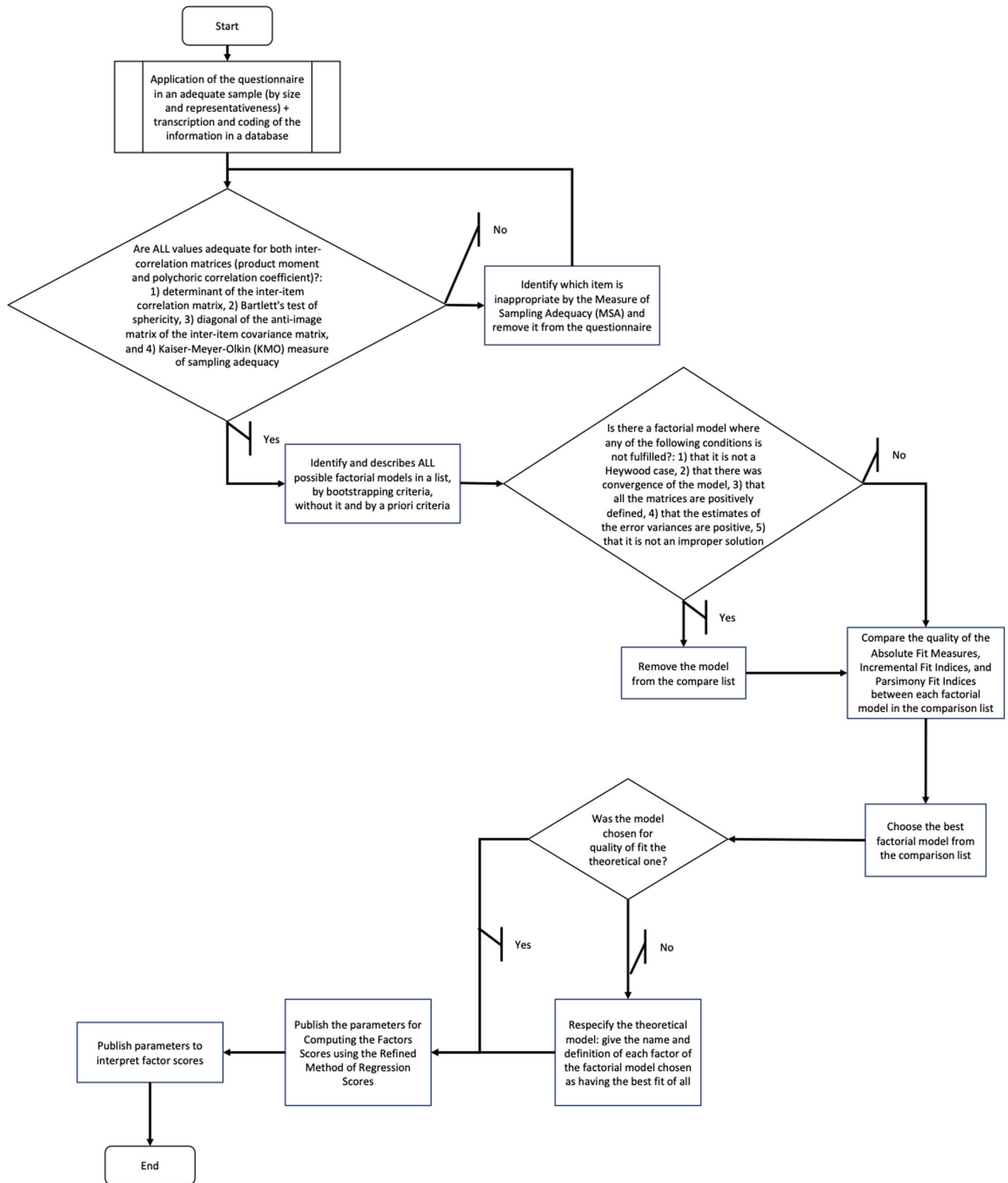
allows to predict and better understand the behaviors and communicational forms, according to their preferences. From the perspective of Platonic philosophy, archetypes are ontological causes that exist a priori; eternal, subsistent entities that are on a higher plane than the senses in the world of ideas (Kokolaki, 2020).

However, it was not until the middle of the 20th century that Jung (1970) described the nature of the archetype and outlined a model adjusted to this conception of personality. This first intention to understand behavior from patterns promoted the creation of several models, among which the following stand out:

William Moulton Marston created the DISC model in 1928 which, based on the theory of archetypes, simplifies and groups personality tendencies determined by an axis of rhythm and another interaction with the environment. After this, numerous manuals have described the model (Fernandez, 2010; Utami et al., 2022) and although there are publications that report the validity of its structure, when evaluated using factor analysis on the responses to the questionnaire (Roodt, 1997; Inscape Publishing, Inc., 2008; John Wiley & Sons, Inc. (2013); Prochaska et al., 2015; Price, 2015; Owen et al., 2017), the description of such process is not explicit enough to assess the ability of such studies to minimize the factor indeterminacy (Hair, Anderson, Tatham and Black, 1999) and confirmatory bias (Hair et al., 2014) or random capitalization bias (Batista-Foguet et al., 2004), nor are the results of the process presented (factor loadings matrix, fit indicators, among others), which would allow determining the internal validity to their statements. Figure 1 shows the work route that should have been followed.

Some of the aspects that do not have evidence of implementation for validation are:

- Relevance and nature of intercorrelations' matrix between items used (tetrachoric, moment product or polychoric?)
- Justification of the existence of an underlying factor structure as a dimensional space (KMO coefficient, determinant of the intercorrelation matrix and significance of the test sphericity).
- Individual contribution of the items to the dimensional space (MSA coefficient)
- Explanation and justification of, among all the existing types of factor analysis, which was used to perform the calculations.
- Criteria used to identify the underlying factorial structures to determine which structure best explains the response to the instrument, considering that they made use of an "exploratory factor analysis" (p. 10).
- Assessment of the adjustment of multiple rival factorial models present in such analyses.
- Type of method used for the calculation of the factor score (DiStefano et al., 2019), if when interpreting the DISC scores, this is made from a normative interpretation rather than a criterial one (Hernandez et al., 2016).
- Relevance of the computational strategy chosen to ensure the diagnostic properties of the imaginary model that would theoretically explain the responses to the DISC questionnaire.
- The structure of the best factor model's comparison to explain the DISC responses regarding its imaginary model.
- Justification of the use of other types of analysis, such as cluster analysis (CA) or multidimensional scaling (MDS) in the context of the instrument's validation.
- The specification of the clustering technique utility and the justification for its choice. Also, the rule for classifying subjects in each cluster should also be stated.



**Fig. 1** Work route that should have been followed for the previous theoric analysis.

All that is mentioned above is of utmost importance considering that, as stated in Hernandez et al. (2016), there has been an important change in the concept of validity. This is because not only the test is validated, but also the interpretations or specific uses of its scores. Therefore, knowing the justification of the calculations and how this affects the methodology to establish

the diagnosis with such an instrument is essential to assess its validity.

For example, Prochaska et al. (2015) affirm that the results justifying the validity of their version of the DiSC are in a dissertation by Marble (1997), which is not publicly available and although they name the use of exploratory factor analysis (EFA)

and CA, their description is too superficial as to know all the aspects pointed out.

John Wiley & Sons, Inc. (2013) hypothesize that adjacent scales (e.g., D and i) of the DiSC® should have positive and moderate correlations. Also, they add up the fact that “these correlations should be considerably smaller than the Alpha reliabilities of the individual scales” and the theoretically opposite ones (e.g., I and C) should have strong negative correlations. The results shown for the correlations between the eight scales indicate strong support for these hypotheses. Though, when analyzing geometrically the shape of the imaginary model of both the “DiSC® Circumplex Model” and the “Eight DiSC® scales”, it is observed that the way in which these hypotheses were stated does not relate to the true shape of the models. Therefore, it would have been more appropriate to verify the following:

1. The existence of a two-factor orthogonal first-level model, as explained in the Inscape Publishing, Inc. report (2008), which at the same time would divide in four the vector space from its center with two vectors whose union has an angle of 90° (orthogonal), to represent the “DiSC Circumplex Model”. The circle represented in this imaginary model, also contains mathematical properties, being the “circle of one radius called ‘circle of correlations.’” Therefore, it would have been appropriate to analyze the magnitude and direction of the factor’s charge in the items at both factors. This, assuming that the two-factor structure is non-hierarchical and that this is the best way to explain the responses to the questionnaire.  
To affirm that Dominance (D) is opposite to Stability (S) these items must have their highest charges on the same factor but with opposite directions to each other. The same should apply to the caste of Influence (i) as opposite to Conscientiousness (C). Due to this, the idea of positive and negative correlations between the factors would be eliminated since they would be orthogonal. Furthermore, this approach would not validate the existence of the “Eight DiSC® scales” model (p. 6).
2. Regarding the “Eight DiSC® scales” (p. 6), there are two possibilities for their formalization:
  - a. Assuming a 45° orthogonal rotation of the previous axes in a counterclockwise direction, there is no added value on the factorial structure of the “DiSC® Circumplex Model” (p. 4). Like this, neither the affirmation of the existence of eight different scales nor the use of correlation coefficients between them to establish their validity would be justified. The only thing that would remain formally is to reconsider the “Eight DiSC® scales” (p. 6) as a classification of people into eight groups, according to their differential response pattern along the space of four quadrants generated from the two vectors that serve as centralized axes. This could then be evaluated from the result of cluster analysis, after previously determining the fulfillment of the assumption of cohesion and separation between clusters, based on the use of the silhouette measure (Rousseeuw, 1987).
  - b. The second option is that the impossibility of adequately representing a space greater than three dimensions ( $R^3$ ) in a two-dimensional plane, as attempted in the graph illustrating the imaginary model of “Eight DiSC® scales” (p. 6), does not imply that mathematically it cannot be done. This is because “vector spaces can have any dimension  $[(R^n)]$ ” (Ferrer and Le Clainche, 2019, p. 59). Therefore, following the same logic of the formalization in the “DiSC Circumplex Model” (p. 4), it would be enough to demonstrate the existence of a model of four orthogonal

factors, called: (1) D and S, (2) i and C, (3) Di and SC, and (4) CD and iS with their respective magnitudes and factor charges. Having in mind what the theory explains, it is pertinent to assume that this is the model that best explains the responses of the DiSC questionnaire. This model would generate a segmentation of this space into eight quadrants starting from its center, which would again invalidate the use of correlation coefficients between scales to validate its existence and the affirmation of the existence of eight scales when there are only four of them.

Nevertheless, it is not possible to use a comparison between the correlation coefficients in pairs of subscales and the internal consistency coefficients of each of them as evidence of the validity of the structure of any questionnaire, as stated in the publication of John Wiley & Sons, Inc. (2013), since they are indicators that refer to different issues.

Another aspect that belies the conclusions of the existence of eight factors in the DiSC® questionnaire is that the results of the factor analysis of principal components used only show the existence of two factors, instead of eight. Adding up, these calculations do not really validate the dimensional structure of the questionnaire, since the calculations were not made at the item level, but rather arbitrarily assumed the existence of the scales proposed theoretically. Because of this, without validation, it combines the items into eight scales. By having in count these assumed and unvalidated scores, the factor analysis was performed. Therefore, it is not possible to ensure that the instrument really has these two underlying factors at the item level. This same error is observed in the results of the principal components analysis (PCA) and the principal axes factor analysis (PAF) performed by Price (2015). These two analyses consist of a four-factor structure conveniently chosen based on 70% of the variance explained and justified by the literature. However, this literature is weak since:

1. It is possible to find literature that stated that this cutoff value is different, for example, 60% (Hair et al., 1999),
2. There are other additional criteria to achieve the same objective, and all are equally valid. On the other hand, regardless of the criterion used for the number of factors’ choice, the factor indeterminacy will remain. This implies: “(1) A set of data can be explained with the same precision with uncorrelated or correlated factors. (2) The factors are not uniquely determined” (Peña, 2002, p. 351). Therefore, the solution to this bias is not found in the results of any exploratory factor analysis.

A third aspect that is important to mention is that the analyses of the structure of a questionnaire should comply with the principle of univocity and orthogonality (Nunnally and Bernstein, 1995) to ensure that its measurement is isomorphic (Stevens, 2002) to the construct it measures. This means, that it has a “close correspondence between the formal model [of the theory] and its empirical counterpart” (Stevens, 2002, p. 2). This would imply that: (1) there should be no correlations between the scales and (2) the specification table (two-way grid, blue print) that conceptualizes the DiSC questionnaire, should ensure that each of its items reflects a specific content and a single specific mental behavior (Moreno et al., 2015). Nevertheless, the absence of the questionnaire specification table and the result of the factor loadings matrix at the item level in all the analyzed reports, makes it impossible to really conclude what their dimensional structure is nor do they make any judgment about their dimensional validity.

The lack of information on questionnaire specifications and item-level factor loadings are of particular importance in

assessing the relevance of the statements made by John Wiley & Sons, Inc. (2013) regarding the principle of univocality since their scales: Di, iS, SC and CD, seem to violate this principle in their items. An example is that the same item of scale could be measuring two different factors at the same time being in the Di and iS scales.

Uniqueness and orthogonality are essential for the DISC imaginary model to cross the two factors at its center with a 90° angle. However, some reports present as evidence of validity a matrix of intercorrelations between scales (or factors) with non-zero values, even when orthogonal rotations, such as varimax, are performed, or even when item-level factor analysis (IFA) is carried out. In these cases, the existence of such intercorrelations is explained using unrefined methods (DiStefano et al., 2019) for the factor score's calculation when they should have, instead, used refined ones that maintain this property. Out of this refined method, the regression method (Kaiser, 1962) is the "legitimate one [for the calculation] of factor scores in [principal] component analysis" (Glass and Maguire, 1996, p. 298). This is because it is not a simple estimation of them as it is with the other methods and it allows to generalize these metric properties of orthogonality and uniqueness "when generalized to a new sample" (Gorsuch, 1974, p. 125).

As we will explain later, orthogonality is crucial to be able to use these scores as predictors of behaviors external to the questionnaire, such as work performance among others. In order to introduce them in various formulas that allow predictions to be made, it is necessary that the scores comply with the principle of independence, which implies that there is a correlation of 0 between the predictors. It is important to note that this aspect is violated in all the reports analyzed and erroneously stating that it is evidence of the dimensional validity of the DiSC® version being discussed, when in fact the opposite is true.

Another common problem with all reports is the order in which they present their evidence of validity and reliability. Although today it is accepted that "there are not different types of validity (content, construct, criterion-referenced), a single type [and...] different sources of validity evidence are accepted" (Hernandez et al., 2016, p. 11). It is also known that they maintain a specific order so that in the "first place, the items should be analyzed both qualitatively and quantitatively".

"To select the adequate items from the psychometric point of view, once they have been selected, the dimensionality of the instrument is studied to obtain the evidence of the internal structure's validity. Once the measuring instrument's scores dimensionality has been determined, an estimation of reliability is carried out. Subsequently, in order to obtain evidence of validity, the relationship of the measuring instrument with other assessment instruments must be observed. Finally, a rating of the measurement instrument is carried out where the cutoff points can be established for some practical or professional purpose" (Muñiz and Fonseca-Pedrero, 2019, p. 12).

This must be the obligatory order since the structure of the instrument must first be known in order to be able to make the rest of the calculations that depend on this structure. However, this order is violated in all the reports. For example, the case of Roodt (1997) is particularly problematic since he jumps from content validity to criterion validity and never analyses the validity of his questionnaire's structure. In the case of the other reports, the order is violated by first presenting reliability and/or intercorrelation between scales and presenting evidence of dimensionality (confirmed bias).

Another aspect that is important to clarify is when reference is made to the dimensionality of the scores, it should be made based on the use of the AFI, as Ferrando et al. (2022) stated. This use is the technique that allows to know which is the structure that best

explains the responses to the tests, the relevance of the item in its conformation, the way in which they are grouped in this structure, the magnitude and direction of the item's representation as an indicator of each factor, and the calculation rule that allows obtaining adequate estimates of a person's position in each factor. Factors serve as a coordinate system defining a specific measurement space. Represented as vectors, they are essential for measuring the properties of the mind, (Thurstone, 1934) and allowed us to comply with certain principles of measurement theory (Grabinsky, 2013). This determines, for example, why our measurements reach only an interval level (Stevens, 1946). The reason behind this is that when measuring, we cannot achieve a function that assigns a non-negative real number (or  $+\infty$ ) to certain subsets of a set X, since the Euclidean space ( $\mathfrak{R}^n$ ) generated by its n component factors, is centered at 0 due to the orthogonal intersection of the space of orthonormal vectors<sup>1</sup>, since its position is a scalar magnitude. This is fundamental to affirm that a psychological test is a measurement instrument that is useful with refined methods of calculation (DiStefano et al., 2019). The number of scales present in a questionnaire depends on the number of underlying orthogonal factors capable of adequately explaining the variability of responses to it. Because of this, John Wiley & Sons, Inc. (2013) findings validate the existence of 8 scales when their results (miscalculated as they did not come from an AFI) give the existence of 2 factors. Also, it is pertinent to mention Inscape Publishing, Inc. (2008) results (also miscalculated and which we will explain below) "support the suitability of the DISC Classic items to measure the two dimensions within the DiSC model" (p. 17). Due to this, they will present all the other calculations and the correction norms of their version of the DISC assuming the existence of four factors instead of two.

We see how in both cases it is unknown that the number of scales in an instrument is equivalent to the number of factors underlying it, thus revealing their misunderstanding of the term "scale" in the psychometric context.

In the case of Roodt (1997), another problem can be observed which is that, although it provides evidence of content validity using the expert validity method, its execution violated the principle of independence between the experts who wrote the items and those who later validated them. Since both activities were carried out by the same people who also worked for the consulting firm, there was a conflict of interest. Although The Inscape Publishing, Inc. (2008) report shows the results of an AFI, it has three problems. First, they did not find any strategy to minimize factor indeterminacy. Second, they undertook confirmatory bias by testing only the proposed model without comparing the fit of other "possible models [that are] acceptable." (Hair et al., 1999, p. 619).

By stating that they "specified a two-factor solution" (Inscape Publishing, Inc., 2008, p. 9), their study did not seek to find the best structure that explained the responses to the questionnaire regardless of the bias introduced by the theory. On the contrary, they limited themselves to analyze only what was predisposed by it, giving "preference for information that is consistent with a hypothesis rather than information that is opposed to it" (Plous, 1993, p. 233). Epistemologically, they did not adhere to the principle of falsifications as a demarcation of scientific knowledge (Popper, 1934/2008), making it difficult to give "a definitive answer to the question of whether a test measures a certain attribute or not" (Borsboom, 2006, p. 431). Also, the method used for factor score calculation in Inscape Publishing, Inc. (2008) was the unrefined "Summed Scores: Stated Variables" (DiStefano et al., 2019, p. 3). Although is a common way of referring to psychological instruments, this method has a technical problem. The major problem is that it does not recognize the differential

**Table 1 Most relevant research and authors about digital archetypes, personality traits, digital culture, and their organizational applications.**

Author	Topic	Relevant research
Jung, 1970 Fernandez (2010)	Archetype and personality DISC	Nature of the archetype and outlined a model adjusted to this conception of personality. DISC: simplifies and groups personality tendencies determined by axis of rhythm and interaction with the environment.
Hernández et al. (2016)	Validity	Important change in the concept of validity: not only the test is validated, but also the interpretations or specific uses of its scores.
John Wiley & Sons, Inc. (2013)	DISC	Hypothesize that adjacent scales (e.g., D and i) of the DiSC® should have positive and moderate correlations.
Ferrando et al. (2022)	Validity	When reference is made to the dimensionality of the scores, it should be made based on the use of the AFI
Musa (2022)	DISC—Organizational applications	DISC used for personnel selection.
Kamtar et al. (2019)	DISC—Organizational applications	DISC used for prediction of job performance.
So et al. (2020)	DISC—Organizational applications	DISC used for managing customer satisfaction and service quality.
Poulopoulos et al. (2018)	DISC	DISC for describing influencers' personalities and analyzing their relationship with the characteristics of their discussions to make recommendations to cultural institutions.
Roodt (1997)	DISC—Organizational applications	Face validity and combined with the simplicity of its application, has led to DISC use by world-class companies.

weights of the items in their ability to represent the factor (factor loadings). Furthermore, it does not consider the idea of a measurement, which impossibilities standardization regarding the coordinates that the vector space created by the factors. As a result, the scores are not orthogonal and present in Table 1 intercorrelations between factors different from 0.00. This means that it does not comply with the form of the DISC imaginary model, where the scores should cross at the center with an angle of 90°.

The problems present in Price (2015) are that he uses the notion of factorial analyses with Q-technique to justify the use of “a small number of subjects” (Price, 2015, p. 9) to know: 10 different samples of 20 subjects each (without explaining why such small sample diversity). However, he erroneously states that the PCA and PAF are examples of this type of factor analysis when they are really examples of the R technique. This is because what is being grouped in the PCA and PAF are the items instead of the subjects. In fact, his interpretation is along these lines when he states that in “all 10 analyses, the results provided evidence of a four-factor dimensional structure underlying the IML DISC instrument” (Price, 2015, p. 9). Consequently, he cannot do otherwise since in order to conclude the dimensionality of an instrument, this can only be done from an R-factor approach instead of from the Q-factor approach, which would assume the dimensionality of individuals.

Another statement by Price (2015) that is illogical by discussing it by analyzing the dimensionality of an instrument, is that the “inherent nature of the forced-choice measurement approach [of items] makes traditional factor analytic techniques (R technique) often inappropriate due to the “correlated” nature of the item formats” (Price, 2015, p. 9). This is because there can be no dimensional structure if its items are not correlated. In other words, if the items were not correlated, there would be no dimension underlying the instrument. In fact, this assertion ends up nonsense when a confirmatory factor analysis (CFA) is subsequently carried out as evidence of the LMI DISC dimension from an R-factor approach, which is only possible if the items are correlated.

Another error of Price (2015) was the use of two rotation techniques of different nature for the same purpose. It was that when the analyzed structure is not hierarchical, given that the varimax rotation is orthogonal in nature and the promax is

oblique, without giving any explanation. Although this does not affect the description of the factorial structures which remain the same whether they come from oblique or orthogonal rotations because of factor indeterminacy (Peña, 2002), it does have a detrimental effect when calculating the correction parameters of the questionnaire by any of the refined methods. Mentioning this, if the information from the information is used, the factors will be oblique and this not only violates the structure of the DISC imaginary model (which is orthogonal) but also violates the basic principles of measurement referring to the conformation of norm-referenced or norm-references and criterion-referenced scores.

Regarding Price's (2015) CFA, the sample size of 200 subjects is insufficient for this purpose due to its statistical power that does not provide population information that allows assessing this aspect. Likewise, having tested only one factorial model leads to confirmatory bias, even more so when one of the adjustment indicators interpreted by Price does not have any interpretation threshold (Hair et al., 1999). Therefore, their assessment is only made based on their comparison between rival models. On the other hand, even if it was feasible to assume the possibility of a positive correlation between the poorly name adjacent scales (C/S or C/D) and negative correlation between the poorly named opposite scales (D/S or C/I), the results of Price (2015) invalidate the DISC since the correlation between Compliance (C) and Influence (I) was 0.12. Also, the Firmness (S) and Dominance (D) was 0.06, so the supposed opposition between them would not be validated.

Finally, another aspect that confuses the evidence of validity argued in the different reports evaluated is the use of images that supposedly demonstrate the existence of their model. Some publications such as Extended DISC International & Extended DISC Global (2015) or Kurz et al. (2021), present a graph with numbers as coordinate systems<sup>2</sup> that would explain how to create such graphs. The problems with all this are: (1) in the cases of reports that do not present a coordinate system, they do not plot real results obtained from an MD or the AFE at the item level. This, since they are not clear because they do not represent<sup>3</sup> in the plane, neither the differential positions of the items nor the differential position of people. (2) to represent a point in a Cartesian plane in  $R^2$ , only 2 coordinates are needed. However, Extended DISC International & Extended DISC Global (2015) or

Kurz et al. (2021) present innumerable numbers of coordinates in the Cartesian plane in  $R^2$ .

All the above would seem to agree with Furnham's (1992) statement when he points out that the "choice of personality variables has been arbitrary and non-uniform."

Some personality tests have been favored because they have been commercially exploited rather than because of their reliability and validity. "Some outdated tests, long forgotten and condemned by psychometricians, are still popular" (Furnham, 1992, p. 35).

Different versions of DISC questionnaires are recently being used for personnel selection in an Indonesian airport (Musa, 2022), allowing the prediction of job performance of a large financial company in Thailand (Kamtar et al., 2019). Also, it provides them with improvement recommendations based on this (Aini, 2021), manage customer satisfaction and service quality in hairdressing workers in Korea (So et al., 2020), describe influencers' personality and analyze their relationship with the characteristics of their discussions to make recommendations to cultural institutions (Poulopoulos et al., 2018), selection of social workers in Indonesia (Khairunnisa et al., 2021) and even automate their application via web for organizational purposes (Aditama et al., 2019). This without mentioning all those organizations that make use of this test labor decision-making without really ensuring the validity of its dimensional structure and/or the scores referred to both norm and criterion. This would also be a violation of labor-related human rights (Polo et al., 2022) by making diagnostic judgments based on invalid norms since when these types of judgments occur, they can be classified as unfair (Gomez-Benito et al., 2010) because they do not guarantee the fairness and validity of their interpretations. Nevertheless, its face validity (Hogan, 2018) combined with the simplicity of its application, due to its short length when compared to other personality questionnaires, has led to its use by world-class companies such as Toyota (Roodt, 1997). For this reason, developing a DISC questionnaire that rigorously complies with all the aspects of psychometric validity would be a step forward in correcting such technical aspects that lead to unfair judgments and making relevant to contemporary reality the specific case of profile management related to dynamics of an organizational digital culture. Therefore, we will now describe the theoretical aspects that will give rise to a second publication on the psychometric findings of the validation of the norm that corresponds to this instrument.

The theoretical model of Digital Archetypes takes up the DISC imaginary model to define personality characteristics based on the interaction with technology and readiness to change. The purpose is to define archetypes that favor the formation of project teams capable of addressing the hyper-digital challenges of our time.

Table 1 includes a table with the most relevant research and authors about digital archetypes, personality traits, digital culture, and their organizational applications.

### Digital personality matrix

Digital personality is defined by two axes in which attitude and openness to change and attitude toward the use of digital resources are evaluated (See Fig. 2). The  $x$ -axis establishes the personality factors regarding attitude and openness to change and the  $y$ -axis establishes the personality factors for attitude and openness to the use of digital tools.

Those with less "Stable/S" personality traits in the DISC model are more open to receiving new technologies. For this reason, their interaction with changes is defined as the first variable. On the other hand, those who have greater "autonomy" and who

have the ability to "manage on their own", tend to appropriate digital changes quicker.

**Interaction with technology.** Some people are more attracted to processes involving digital tools and prefer to interact with chatbots, websites, instant messaging applications and some other available digital applications. They feel more comfortable when they can access a service, through any of their devices, without restriction of time or places. On the contrary, they may feel uncomfortable if they need to ask questions or interact with people because the process is not fully automated (Ghorbani et al., 2022; Nguyen, 2022; Yang and Hu, 2022).

It is very common to find this type of approach in people who have grown up in a digital world and are very familiar with emerging technologies. These people consider themselves more "digital".

In contrast, some people prefer processes in which interaction with people is a priority. They prefer to go to a place, talk, ask questions and focus the attention of their listener. These are people who feel that the attention of a technological element is impersonal and perceive that their needs are not completely understood by an element of this nature. These people consider themselves to be more "analog".

**Interaction with change.** Some people enjoy participating in innovation teams, they are constantly looking for new ways of doing things since they feel better breaking routines and trying new things. On the contrary, they get bored when the work becomes operative, repetitive and monotonous, so they seek to delegate or automate such tasks in order to dedicate themselves to those that are more creative and less controlled (Bleidorn et al., 2022; Haehner et al., 2022).

The risk of innovating, even if it means facing mistakes and "failures", captivates them because, from their point of view, the hope of discovering better ways is more important than maintaining security. These people consider themselves more "explorers".

In contrast, some people who value precision and accuracy in results prefer processes that are standardized, proven and whose results are guaranteed. These people are capable of innovating, but in very controlled frameworks that do not affect the profits of the processes they use today. For these people, it is very important to have information to analyze and make safe decisions. Data and facts are very necessary for the innovation process. For this reason, they prefer to wait for technologies to mature and reach a reasonable point rather than experiment with new tools that may somehow induce errors in the operation. These people consider themselves to be more "conservative".

### Digital archetypes and profiles

The proposed model of digital archetypes is a tool that helps to better understand people in environments of change and innovation by understanding personality characteristics and how they contribute to team results. This tool allows to understand the best way to interact between personality styles to achieve synergy, complement virtues, balance critical points and thus, get the best out of each of the team members in digital transformation processes.

In a simple definition, the digital archetype is the result of an assessment that provides information related to the priorities and preferences of each person in relation to technology. Thus, it frames it in a style with certain characteristics, which allows to foresee its performance in a work team and to make recommendations so that the interaction is fluid and for it to generate better results.

All archetypes are valuable and necessary in a transformation model. Having people associated with different archetypes

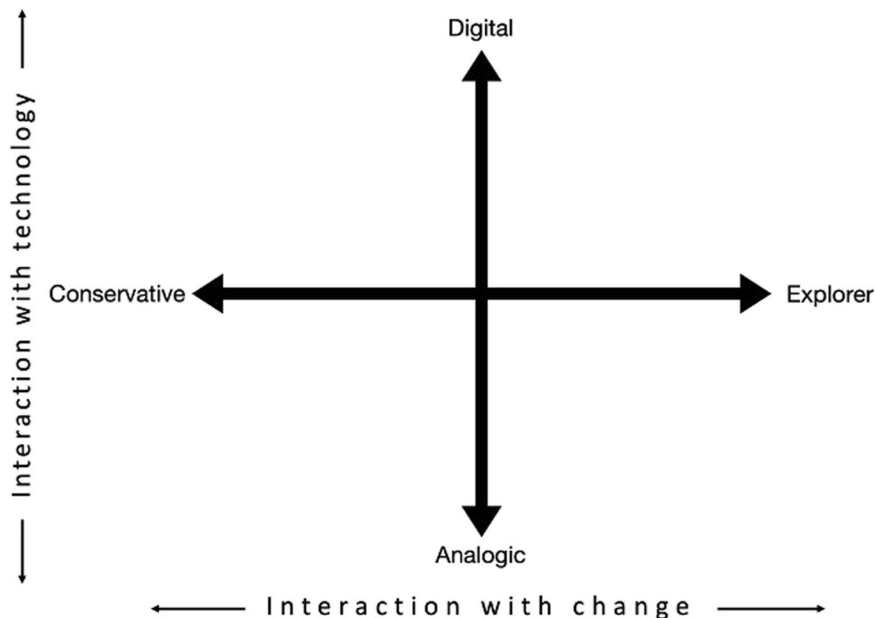


Fig. 2 Digital archetypes in the interactions' plane.

Table 2 Digital archetypes in the interactions' plane.				
Archetype	Innovative	Visionary	Cooperative	Traditional
Interaction with technology	Digital	Digital	Analog	Analog
Interaction with change	Explorer	Conservative	Explorer	Conservative
Principal characteristics	Futuristic	Direct	Precise	Precise
	Enthusiastic	Result-oriented	Methodical	Methodical
	Creative	Risky	Analytical	Analytical
	Entrepreneur	Practical	Systematic	Systematic

ensures a humanized and effective digitalization. Thus, this model defines four digital archetypes. If a person is “digital” and “explorer”, he or she will be an innovator. If a person is “digital” and “conservative” he or she will be a visionary. If a person is “analog” and “explorer”, he or she will be cooperative. If a person is “analog” and “conservative” he or she will be traditional. Table 2 shows a summary of the different digital archetypes according to the correlation with each of the characteristics of interaction with technology or change. Thus, based on the configuration of these two variables, the four quadrants emerge defined by their orthogonal intersection. This intersection does not represent one state better than the other, but it does represent the different types of digital personalities that a person can have. Their advantage or disadvantage can be presented according to the situation, represented in Fig. 3.

It is important to be clear that the four different factors do not represent that one state is better than the other one. It represents the different types of digital personalities that a person may have and their advantage or disadvantage can be presented according to the situation.

As in any model of archetypes and personality factors, all people have characteristics of the four digital archetypes, having a higher level of marking in some of them. Thus, by combining the two archetypes that a person may have marked mostly, it is possible to define a series of profiles.

People who identify as an “innovator” in their primary archetype and as a “visionary” in their secondary archetype will be defined in the flexible profile. This is a resourceful, observant, practical and determined person. They enjoy doing things

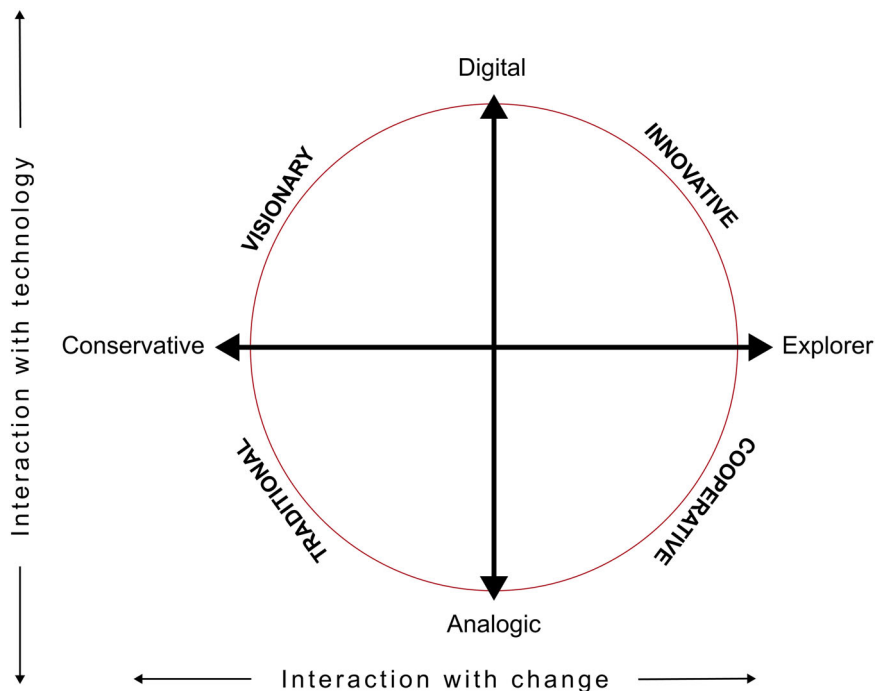
differently every time. Creative processes motivate them, as they like to express their ideas and explore those of others. They are daring, agile and in essence: dream achievers.

People who identify as a “visionary” in their main archetype and as an “innovator” in their secondary archetype will be defined in the pioneer profile. They are curious, dynamic, determined and result oriented. They like to imagine new ways of doing things and enjoy seeing their ideas become reality. Their taste for technology and digital ways of doing things leads them to constantly think about standardizing processes and avoiding the operational and repetitive. For this reason, they constantly explore new technologies and try to keep themselves updated.

People who identify as “cooperative” in their primary archetype and as a “visionary” in their secondary archetype, will be defined in the versatile profile. They are enthusiastic and enjoy dreaming and devising. Thinking of new ways of doing things makes them feel good and useful. They create models and solutions that, even though they may seem difficult, their ability to convince make the teams feel encouraged to achieve. They are eloquent, receptive, influential and good listeners.

People who identify as “cooperative” in their primary archetype and as “innovator” in their second archetype will be defined in the perseverant profile. They are people who promote personal relationships of very high value. They know how to listen, to accompany and are good at perceiving the emotionality of others. They are a very good team member, collaborative, hard-working and responsible. They enjoy participating in creative spaces because they are dreamers, ingenious and optimistic.





**Fig. 3** Digital archetypes in the interactions' plane.

People who identify as an “innovator” in their primary archetype and as “traditional” in their secondary archetype will be defined in the reliable profile. They are very warm, kind and gentle people who give priority to personal relationships, harmony and stability. They tend to follow rules and systematically apply processes. They often think about others’ welfare rather than their own. They can perceive the emotions of caring for the user to have a harmonious experience.

People who identify as “traditional” in their main archetype and as “innovator” in their secondary archetype, will be defined in the cautious profile. They are precise, responsible, methodical, rule-bound and have a great capacity to identify and manage risks. They like to establish processes and stick to them. They accept new ideas if they do not affect the operation since they appreciate highly guaranteed practices with rigorous controls.

People who identify as “visionary” in their primary archetype and as “cooperative” in their secondary archetype will be defined in the inspirational profile. They are resourceful, observant, practical and determined. They enjoy doing things differently every time. Creative processes motivate them since they like to express their ideas and explore those of others.

People who identify as “cooperative” in their main archetype and as “visionary” in their secondary archetype will be defined in the executor profile. These are people who make a permanent balance between the use of technology and its humanization. When digitizing a process, they will be the one who ensures that the benefits of interaction with people are not lost to secure that the emotion, warmth and harmony of the service are maintained.

People who identify as “visionary” in their main archetype and as “traditional” in their secondary archetype, will be defined in the methodical profile. They are careful and cautious people with a special taste for standardization and the use of technology.

People who identify as “traditional” in their main archetype and as “visionary” in their secondary archetype will be defined in the strategist profile. They are careful and cautious people with a special taste for standardization and the use of technology. They like quick but consistent results.

Table 3 Digital profiles resulting from the combination of digital archetypes.				
	Innovative	Visionary	Cooperative	Traditional
Innovative		Flexible	Versatile	Reliable
Visionary	Pioneer		Inspiring	Methodical
Cooperative	Persevering	Executor		Collaborative
Traditional	Cautious	Strategist	Perfectionist	

People who identify as “cooperative” in their primary archetype and as “traditional” in their secondary archetype will be defined in the collaborative profile. They are very warm, kind and gentle people who give priority to personal relationships, harmony and stability. They tend to follow the rules and systematically apply the processes.

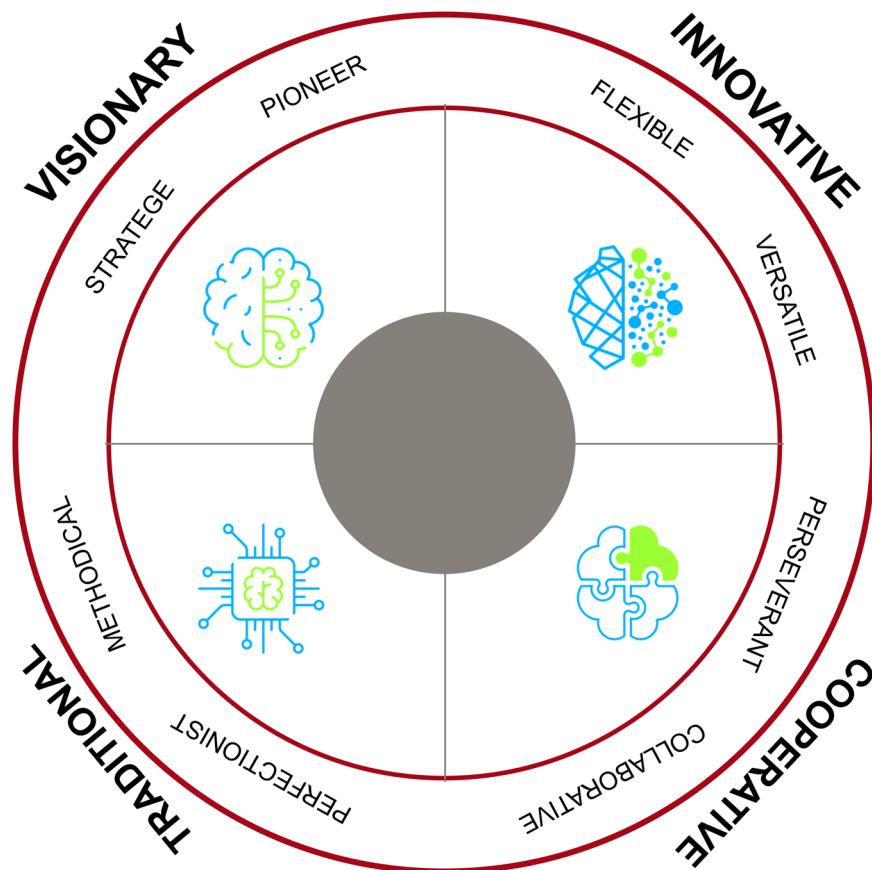
People who identify as “traditional” in their main archetype and as “cooperative” in their secondary archetype will be defined in the perfectionist profile. They are precise, responsible, methodical, rule-bound and with a great capacity to identify and manage risks. They like to establish processes and stick to them.

Table 3 shows an overview of the digital profiles obtained by combining different archetypes. A schematic is also presented (see Fig. 4) showing the different archetypes with their respective digital profiles.

**Case study**

Is it possible to execute technological innovation projects with ember with great ideas that do not find an adequate flow of interaction nor manage to combine their good intentions leading to not reaching the result?

This case study marks the inception of a proposal aimed at identifying and suggesting improvements to the DISC model, ultimately enhancing its validity and consistency. While the DISC model has faced challenges and undergone extensive analysis, affirming the existence of personality profiles, this case study



**Fig. 4** Digital profiles resulting from the combination of digital archetypes.

enables us to introduce variables that better align with the realities of technology projects. In this section, we will provide a summarized version of the previously mentioned validation studies, concluding that embarking on this path will result in a model tailored to specific needs with the necessary adjustments to address the gaps in the foundational DISC tool.

Rubinstein (2007) presents some conclusions about the success and failure of projects. He refers to 10 causes for which 71% of the projects failed and 6 of them related to human factors, which are the following: (1) Low user participation (2) Incomplete requirements and specifications (3) Frequent changes in requirements and specifications (7) Unrealistic expectations (8) Unclear objectives and (9) Unrealistic schedules.

By 2020, although the project success rates had improved, the number of failures was still very high and still largely attributed to human factors (Portman, 2020). At the same time, there was corporate experience of a digital transition program with a portfolio of 69 initiatives that had to be executed within a maximum of 6 months. This showed having a very high readiness for change and mitigating all possible resistance associated with human factors.

Up to that time, stakeholder diagnoses in the organization used psychometric tools that allowed the identification of personality factors that facilitated or play against change processes. However, beyond the personality characteristics associated with normal interaction at work, it was necessary to consider the specific interaction with new technologies and the ability to devise, imagine and execute new projects that demanded leaving the usual work area. Figure 5. shows the step-by-step case study about how we improved team interaction in high-pressure situations.

In this case, 80% of its employees had been affiliated with the organization for more than 15 years, extensive experience in the business, and skillfully executed the current procedures. These

conditions, which seemed to be a strength, generated a resistance to change in the usual way of doing things.

In order to include new personality characteristics that would allow a “cultural radar” grouping personality tendency, the decision was to design a model that would include these new variables to analyze the personalities of this group. In this way, it will be designed strategies for each segment that would help them to move smoothly toward the new ways of working to appropriate the new technological tools at an early stage of the process.

Once the model was structured based on the postulates mentioned in the previous sections, tests were developed to validate that the instrument created could provide certainty regarding the distribution of personalities in the target group.

A group of 200 people belonging to a specific project was selected for the digital personality test to be applied. This test consisted of a questionnaire of ten variables that allowed to place each member of the team in a digital archetype that led to the creation of strategies. The first results showed that 32% of the project team members were associated with the “Methodical profile”, meaning that they have in their team careful and cautious people who were willing to receive new technologies without affecting the operation. It was constantly stated that they did not want “mistakes” and that they had to foresee all the risks to ensure that there would be no erroneous data during the transition. These expectations were contrary to the conception of “error” in agile methodologies where the important thing is not the number of errors but the ability to detect them quickly for them to be corrected in time.

Thus, it was identified that one of the main points to be included in the mobilization, communication and training campaigns was a new and improved vision of the meaning of error. This vision was accompanied by an exhaustive research and

# Step-by-step case study

This is how we improved team interaction in high-pressure situations.

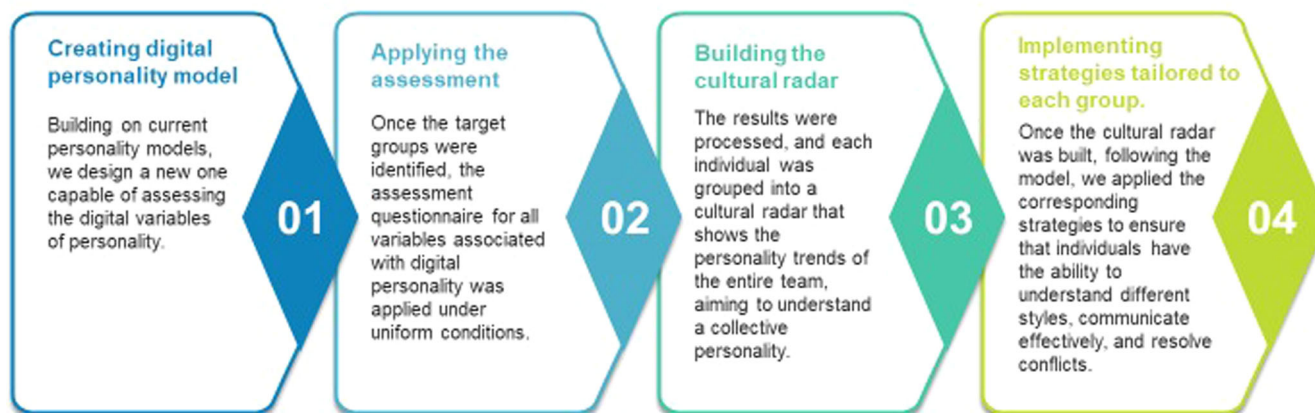


Fig. 5 Digital profiles in case study.

Table 4 Digital profiles in case study.				
	Innovative	Visionary	Cooperative	Traditional
<b>Innovative</b>		Flexible (0.5%)	Versatile (0.5%)	Reliable (0.5%)
<b>Visionary</b>	Pioneer (21%)		Inspiring (0.5%)	Methodical (32%)
<b>Cooperative</b>	Persevering (42%)	Executor (0.5%)		Collaborative (1%)
<b>Traditional</b>	Cautious (0.5%)	Strategist (0.5%)	Perfectionist (0.5%)	

control process that would give this group the security of being in a controlled process and the mission to identify errors, experience them without stress correct them immediately and move on to the next point of innovation.

After the implementation of strategies designed for this group, it was noted that they spent more time finding solutions to correct errors and less time detecting people to blame for the situations that arose.

On the other hand, in the digital culture radar, 21% of the group was identified as belonging to the “pioneer” profile: a mix between visionary and innovator. This group, open to dreaming, thinking and innovating, was also at risk of imagining too much and thinking of solutions that were difficult or impossible to implement. If they could be made to work as a team with the methodical ones, a grounded thinking tank would be reached, which would give a better result.

Thus, the strategies were directed toward the possibility of integrating visionary and innovative thinking with the methodical thinking of the former. This helps the teams to talk about working in an integrated way and to understand how they could take advantage of their skills and those of the other, in function of the digital transformation.

Finally, within this team, 42% were in the “persevering” profile. This means that they have collaborative, hard-working and negotiating people who give a high value on personal relationships. This was an advantage to work but a natural resistance to all processes that involved the replacement of tasks performed by humans that could be automated and optimize the operation. This group of people think that doing projects could displace people.

The strategies with this group were oriented to the understanding of human dignity and the redistribution of tasks. When this group understood that we had to orient the new roles toward the execution of creative and non-repetitive tasks, they found a greater sense of execution. This new definition of humanity allowed them to understand that what they were doing was improving people’s quality of life and triggered their passion for project activities.

The remaining percentage was dispersed in several categories and no specific strategies were designed for them. However, the inertia of the team and the movement of the mass led them to feel in better conditions of innovation and digitization. Thus, the project, which had a technical performance, found an additional influence in the strategies’ results to mobilize human resources.

Table 4 displays the distribution of the team under study according to the profiles defined in Table 3.

Regarding the transformation or change project, identifying the personality tendencies of stakeholders can be a valuable tool. In addition to improving the technical performance of the project, this information can be used to design mobilization, communication and learning strategies that consider the motivations, fears, concerns and objectives of team members.

Some of the purposes for identifying these trends are:

1. Segmenting audiences to communicate with the right language.
2. Facilitate the interaction of team members by knowing their individual needs.
3. Establish a common language that allows for superior understanding.

4. Recognize strengths and weaknesses in a change process to complement strengths and compensate for weaknesses.
5. Ensure the participation and integration of the team members to improve results.

Although it is true that there may be a wide dispersion in the results of the application, having the tendency to generate a way to focus the action may be helpful in leading the company toward a specific change.

Ultimately, applying a digital archetype model can reduce the discomfort of changing routines and speed up the transformation process within the organization. The implementation of the project can be improved in order to obtain better results by keeping in mind the individual characteristics of the team members.

### Discussion and conclusions

Future technology will involve accelerated and deep digital immersion. Disruptive technologies such as virtual and augmented reality, blockchain, internet of things, metaverse and other emerging technologies have arrived to profoundly change the way our species interact socially and spatially.

Respect, management, in IT projects, the human element can heavily influence outcomes. Project leaders often face resistance from team members' personality styles and habits when they prioritize code as the main issue. Balancing task management with managing emotions like anxiety and frustration is crucial. Effective communication is often hampered by these emotions, leading to project delays and decision-making challenges. Managers can greatly benefit from tools that help understand team emotions and behavior. Descriptive personality models are invaluable for creating relational maps that enhance team interaction, urgency, and goal alignment.

In this world, questions will not be about the existence of digital archetypes or skills gaps to develop. Instead, the focus will be on how to close that gap and how to increase the adaptability of people so that they can evolve within this new environment for it to become more innovative, creative and executive.

Exploring behavioral and cognitive challenges that allow people to balance their personality profiles and move with their own will through digital archetypes will give elements to engage them in new spaces.

One way of approaching what is mentioned above is through sociometric analysis, which makes it possible to establish "the structure of the relationships existing in a group at a given moment", thus serving as a reference, for example, to what Polo et al. (2022) and collaborators propose, regarding "the calculation aspects that should govern the decisions of the management of the personnel recruitment and selection subsystem" (Polo et al., 2022, p. 58), focused this time on the configuration of teams of work, from the moment of the selection of the candidate, and providing the generalization and standardization when applied not to their individuals but to their profiles and/or typologies. This is what it is intended to do with a validated version of the DISC for organizational digital culture, increasingly present in daily work environments given the profound transformations that emerging technologies are generating in the new conception of the world. But this validation must comply with the technical parameters of the measurement theory already described above, in order to ensure the diagnostic precision that is required when making practical use of said measurement; Therefore, the efforts to make the adjustment recommendations to the work teams will arise from how valid said measure is, which, as we explained at the beginning of this article, implies important areas of improvement in this regard, since it does not comply with the specifications. In Fig. 1, this being the main relevance of this study

and in the results of our future work by presenting robust indicators of said measurements for better construction of theory and practical decisions.

Adding up, the creation of balanced teams that can know each other and make their differences enhance their skills is crucial for the success of any technological initiative. This understanding that no style is better than another and that extremes tend to create overextensions that make difficult the processes. Thus, archetypes could be a tool for team knowledge, which instead of creating gaps or elements of discrimination, allows people to be included in the innovation processes. This is by respecting their essence and taking advantage of their virtues. This team self-knowledge also allows to compensate for the weaknesses of each other to make the transition easier.

To summarize, this study has demonstrated the feasibility and value of aligning the presented structure with corporate reality. In the next research phase, we will refine the psychometric model and validate its practical utility. From a managerial perspective, these findings offer valuable insights into improving relationships and boosting productivity within corporate teams. This study promises to open new opportunities for more effective team management in the business environment.

As limitations to the investigation of archetypes, there is the absence of controls for factorial indeterminacy, capitalization of chance and confirmatory biases, in addition to the use of unrefined correction strategies that imply diagnostic imprecision (McNeish and Wolf, 2020; Widaman and Revelle, 2023), for which we suggest that for future work this issue is corrected. Likewise, the collection of this information requires, on the one hand, that it be carried out on members of already configured work teams, as well as the identification among them of consequences of common operation that can serve as the same criterion for the correct calibration of its standard of correction; all this, contemplating the minimum sample size that is required to ensure the statistical power of the calculations, which takes a considerable amount of sampling time that, at the time of this work, has not been completed and remains a pending task for future publications. Once exposed the enormous need to establish the psychometric properties that minimize all the errors already indicated in this manuscript and considering that many organizations are still using it for decision-making, this complaint and its detailed explanation being one of the main contributions of this article.

### Data availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author upon reasonable request.

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### Notes

- 1 A confusion that often happens in the use of the terms: normal, normed or normalized (being all of them synonyms), with the notion of normal distribution. A normalized score involves the comparison of the natural response of an individual regarding its normative group (Hogan, 2018). This is because normalizing is part of a strategy known as reduction ( $X'_i = \frac{X_i}{\sigma}$ ), that seeks to equalize to 1 the dispersion of the data at the item level. Given the heterogeneity of measurement units that may exist among them, this is another aspect that also generates confusion. This is because given the false belief that when all items have the same number of response options, this equalization is automatically produced when it depends only on the corresponding dispersion indicator. Such equalization is important in multivariate measurement as it assumes that DISC is valid for: (1) generating a Euclidean space ( $R^n$ ) by its underlying

factors constructed from its multiple items turned in a vector and (2) that the form of organization of such items in its factors corresponds to the theoretical organization of the DISC model described in its specifications. Measuring is to establish the degree of relative similarity between two or more properties of various objects (in our case, the comparison properties being the factors and the objects to be compared) which is determined by their proximity within space. This is the reason why the calculation distances (Pedret et al., 2000) is imperative to be able to measure and this is achieved by combining or standardizing ( $Z = \frac{X_i - \mu}{\sigma}$ ) the reduction ( $X'_i = \frac{X_i}{\sigma}$ ) with centralization ( $X''_i = X_i - \mu$ ). Because of this, when explaining the normative interpretation contents of the tests in any psychometric A distribution will be described (regularly with the shape of the normal curve), with the parameters mean ( $\mu$ ) equal to zero ( $\mu = 0$ ) and dispersion ( $\sigma$ ) equal to 1 ( $\sigma = 1$ ). On the other hand, a normal distribution assumes the existence of a density function described as follows:  $f_x = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$ . Although the standardization equation Z is part of the exponent of the normal curve function, it does not define it completely. Therefore, it is possible to have Z distributions without necessarily being normal. This mentioned previously can be checked by means of any univariate normality test, such as the Kolmogorov (1933)–Smirnov (1948) test, with Lilliefors (1967) correction. Lilliefors correction is the test usually provided by statistical software for this purpose. The origin of such confusion is that a normal distribution is necessarily normed or normalized and centralized. This is the reason why the notion of a psychological test or scale goes beyond that of a questionnaire since those assume the possibility of applying an interpretation rule that allows considering the data collected in a questionnaire as the product of measurement. Therefore today “the test is not validated but [the] interpretations or concrete uses of its score” (Hernandez et al., 2016, p. 11), while a questionnaire refers only to the data collection instrument. The measurement of the psychological then supposes the conjunction between the instrument that collects the data and the rule of its interpretation in relation to its normative group. This places it within the limits of the theory of measurement by its nature and makes it reach an interval level. Clarifying the origin of all this is essential, not only because of aspects that correspond to DISC later but also because documents (such as Hernandez et al., 2016) promote confusion with statements such as “normalized standardized (standardized scores obtained under the assumption that their distribution is normal)” (Hernandez et al., 2016, p. 8). As we have seen, the fact that a score is standardized has nothing to do with the normal curve. It is redundant to say that a standard score is standardized since standardization is achieved by combining centralization and normalization.

2 See Figs. 3 and 4 or the graphs on page 34 of Extended DISC International & Extended DISC Global (2015) and Fig. 3 of Kurz et al. (2021).

3 For a simple refresher on this, see: <https://www.youtube.com/watch?v=0cUkAd201yw> (spanish) or <https://www.youtube.com/watch?v=LqrHvGaANDI> (english).

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### Author contributions

CVN: Digital culture concepts; Relationship with business digital transformation; Work teams in digital environments; Characteristics of a person with digital attitudes. MT: Relationship of DISC with the proposed model; Change management concepts; Quadrants of attitudes toward change and attitudes toward the digital; Case study. ACM: Previous studies related to archetype construction and DISC; Psychometric contextualization; Theoretical-practical critique and proposal of future work.

### Competing interests

The authors declare no competing interests.

### Ethical approval

This article does not contain any studies with human participants performed by any of the authors.

### Informed consent

This article does not contain any studies with human participants performed by any of the authors.

### Additional information

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