Personality types of Cuban software developers

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ABSTRACT: The measurement of factors involved in human performance has become an essential step to move forward in the software industry. Psychometric measurement provides the needed understanding of human potential. The aim of this study was to establish the personality profile of Cuban software engineers according to the Myers-Briggs Type Indicator (MBTI). Analysis of the study shows that the most prominent personality type is a combination of extroversion, sensing, thinking and judging.

Keywords: Personality type, Myers-Briggs Type Indicator, human factors in software engineering

INTRODUCTION

Human factors in software engineering have different dimensions. Studies have been conducted from different perspectives. These perspectives could be the study of human factors in different phases of the software life cycle, or the effect of teamwork on software development, or how a personality profile can suit a particular task or about some other miscellaneous issues.

A classification scheme based upon the psychological type theory of Carl Jung, the Myers-Briggs Type Indicator (MBTI) personality inventory, has been used for decades to determine personality types [1]. Myers-Briggs Type Indicator also has been employed to improve teaching and learning. The Indicator defines four scales, as briefly described below, to assess personality types:

- Extroverts (E): are individuals whose attention is drawn toward objects and people; who tend to draw energy from the external world of people and things; and who prefer to communicate and process information verbally. Or Introverts (I): whose attention is drawn towards the inner world of ideas; who tend to draw energy from the internal world of ideas, emotions and impressions; and tend to process information internally.
- Sensing (S): attuned to the practical, hands-on, common-sense view of events. Or Intuitive (N): who are attuned to the complex interactions, theoretical implications, or new possibilities of events.
- Feeling (F): who weigh the human factors, and make judgments with personal conviction as to their value. Or Thinking (T): who draw conclusions or make judgments dispassionately and analytically and seek an objective standard of truth.
- Perceiving (P): who tend to keep their options open and are often viewed as spontaneous. Or Judging (J): who tend to seek closure, to be organised and want things settled.

Summarising, the MBTI sorts these four dichotomies – two traits in each dimension, one from each pair, to delineate a person's preferred type. Hence, there are 16 possible configurations, such as ISTJ, ESFP, ENTJ. If the MBTI indicates that a person is ISTP, it suggests that the person's preferences are the ISTP type. There are no rights or wrongs in the personality types, merely preferences.

The MBTI assessor can estimate the personality type of a person based on a score for each bipolar dimension. This score is calculated by the MBTI instruments. There is specific behaviour associated with each category. The MBTI's dichotomies indicate the preference in one of each category, meaning that a person could have different behaviours for

a different category of his/her personality type. It is important to emphasise here that there are no categories superior over others. However as already mentioned, these categories may indicate better performance in some kinds of situation. Surveys have been conducted to study MBTI personality type ratios of software developers [5-9]. However, few references are available related to Latin-American software professionals.

LITERATURE REVIEW

The software industry has become a major force in society. It has, in fact, generated a great deal of discussion as to the unique contributions of professionals engaged in software engineering's many sub-disciplines. Specialties within software engineering today are as diverse as in any other profession. The term, software engineer, encompasses a broad range of positions, such as system and data analysts, programmers, project managers, help desk personnel, and others involved in the planning, analysis, design, construction and deployment of software systems [10]. Software development is comprised of separate and distinct stages, such as: system analysis, design, programming, testing and maintenance. It may be that certain personality dimensions affect one stage but not others, or affect certain stages in different fashions [3].

Empirical studies have investigated the relationship between MBTI and software engineers; Sitton and Chmelir list some stereotypes of programmers and what it is that attracts them to the computer field [11]. Their study paints a picture of creative professionals irreverently solving complicated problems, unencumbered by routine and humdrum details; however, they give no specific statistics regarding their findings. Further, Bush and Schkade tested 58 professionals involved with scientific programming in an aerospace company [12]. They found ISTJ (25%) to be the most common personality type, with the second most common type being INTJ (16%), and ENTP (9%) being the third. They also found thinking (74%) and judging (70%) to be very common.

Buie took a sample of 47 computer professionals employed by a private company under contract with NASA and who were performing work on orbital-related software [13]. The most frequent personality types were ISTJ (19%), INTP (15%) and INTJ (13%), with those three collectively accounting for nearly half the sample; ESFJ (0%), ISFP (0%) and ENTP (0%) were particularly under-represented. The hypothesis that scientific programmers would tend toward an over-representation of Is, Ns, and Ts was supported.

Smith dealt with 37 systems analysts at a large insurance company [14]. The most frequent types in the sample were ISTJ (35%) and ESTJ (30%). From the results, there were slightly more introverts (57%), but there was also a heavy bias towards the sensing (81%), thinking (89%) and judging (86%) types. Interestingly, the four NF combinations were not present at all in this small sample. Larger and more diverse samples would allow more comprehensive data and definitive conclusions.

Lyons surveyed 1,229 software professionals from more than 100 companies, including insurance companies, financial institutions, utilities and hardware manufacturers [15]. He too found ISTJ (23%) to be the most common type, INTJ (15%) to be the second and INTP (12%) to be a close third, noting that these three personality types composed 50% of his sample. He found thinking (81%) and judging (65%) types to be in the majority; furthermore, he also found that 67% of his subjects were classified as introversion types. He was the first to observe that R&D organisations and companies that do a lot of state-of-the-art development attract and hire more Ns than Ss. The opposite occurs in large organisations, where the bulk of the work involves maintaining and enhancing production software systems.

Hardiman has claimed that the MBTI may be the best predictor of who would become a competent programmer [16]. He observed that the majority of good software engineers were ENTJ, INTJ, ESTJ, ISTJ, ISFJ, and ENTP, in brief, mostly NTs and SJs. He implies that NF types tend to have trouble with the sequential and process-oriented thinking required to design and implement software.

Capretz investigated the profile of a group of 100 software engineers (80% male and 20% female) who study in private or public universities, or work for the government or for software companies [6]. They were all productive and motivated software engineers and were selected to participate in this study based on their occupation. All were administered the MBTI (Form G) to assess their personality types. The largest single type found among the subjects was ISTJ. Considering the dominance of introverts in the software field, he concludes, ...*This may partially explain why software systems are notorious for not meeting users' requirements*.

RESEARCH METHODOLOGY AND ANALYSIS

In this study, 103 Cuban software engineers were surveyed who included students (upper-level Informatics Sciences Engineering courses) and professors of the University of Informatics Sciences in Havana, Cuba. Both, the students and professors were directly involved in software projects. The MBTI instrument (Form M, Spanish language version) was used to identify their personality types. They were invited to take the MBTI measure at the university campus. The criteria to select the students to take part in this survey included academic performance, skill and interest in software development, as well as a recommendation by their teachers. Grade Point Averages (GPAs), however, were not taken into account. The ratio between genders was approximately even, with 48% males to 52% females in the sample. The students' age range was between 22 and 23, whereas the professors' age range was between 22 and 27 years.

RESULTS

The personality type distribution is summarised in Table 1 and Table 2 below. It can be observed that among respondents, the number of extroverts (63%) were almost double the number of introverts (37%). Similarly, sensing (71%) dominates over intuitive (29%), thinking (75%) over feeling (25%), and judging (61%) over perceiving (39%). A similar outcome was observed when these results were compared with some of the previous studies [5][6][17]. The survey confirms the over-representation of Ts and Ss with 75% and 71% respectively, as well as the under-representation of Fs and Ns with 25 % and 29 % respectively, as shown in Table 1.

Table 1: MBTI distribution among Cuban software engineers (n = 103).

Type	Quantity	% Over Total
E	65 51% males 49 % females	63
I	38 42 % males 58 % females	37
S	73 42 % males 58 % females	71
N	30 60 % males 40% females	29
T	77 55 % males 45 % females	75
F	26 31 % males 69 % females	25
J	63 48 % males 52 % females	61
P	40 48 % males 52 % females	39

Considering the responders' gender, there is no significant differences among Es; or between Js and Ps, which have the same distribution, as shown in Table 1. Interestingly however, Ns and Ss show the opposite behaviour (60% males, 40 % females in Ns; 42% males, 58% females in Ss). Similarly, this survey shows a relatively higher percentage of males in Ts and a higher percentage of females in Fs.

Unfortunately, there is no registered MBTI personality type data available about the general Cuban population with which to compare these results; still, the research indicates the pattern observed among Cuban software engineers. Out of 16 MBTI combinations, the ESTJ personality type has the topmost representation of 26% among the surveyed Cuban software engineers, as shown in Table 2.

This is followed by ESTP with 13%, and then ISTJ with 10%. Together, ESTJ, ESTP and ISTJ represent half of the sample population. Among the respondents, INFJ and INFP were the least represented, both having 1% followed by ISFP, ENTP and ESFJ with 2%.

Table 2: Cuban software engineers' representation for the 16 MBTI combinations.

ISTJ 10%	ISFJ 7%	INFJ 1%	INTJ 6%
ISTP 5%	ISFP 2%	INFP 1%	INTP 6%
ESTP 13%	ESFP 6%	ENFP 3%	ENTP 2%
ESTJ 26%	ESFJ 2%	ENFJ 3%	ENTJ 7%

It is worth noting that the overrepresentation of ESTPs is in contrast with the majority of previous studies in this domain. On the other hand, ISTJs exhibit a lower value when compared with other studies [5][6][17]. Furthermore, in this study, a moderate rise in ESFPs was observed, as well.

The sampled Cuban software engineers' temperament distribution also has been recorded and is reflected in Table 3. The dominant temperament is ST with 54%; although TJ (49%), ET (49%), ES (48%) are well represented also. NF is the least represented temperament with only 9%. These values, however, are quite similar to the results of previous studies, where STs and TJs have been noted as abundant and NFs as scarce [2][4][6][8][14][17].

Table 3: Cuban software engineers' temperament distribution.

Temperament	Quantity	%	Temperament	Quantity	%
SP	27	26	TJ	50	49
SJ	46	45	TP	27	26
NT	21	20	FP	13	13
NF	9	9	FJ	13	13
IJ	24	23	IN	14	14
IP	14	14	EN	16	16
EP	26	25	IS	24	23
EJ	39	38	ES	49	48
ST	56	54	ET	50	49
SF	17	17	EF	15	15
NP	13	13	IF	11	11
NJ	17	17	IT	27	26

This study shows STs (Sensing and Thinking) and TJs (Thinking and Judging) are the dominant temperaments among the Cuban subjects. According to MBTI, TJs manifest in an orderly and methodical way with decisions based on a logical and objective analysis, whereas STs manifest in a less methodical but more creative and practical manner.

CONCLUSIONS

Although 20 years ago software developers (systems analysts and programmers) had the lowest need for social interaction on the job, at present, human resource professionals responsible for hiring software engineers state that in addition to knowledge in applied computing and business, it is also very important that software professionals have the capacity to learn, ability to work in teams, oral and written communications skills and an orientation toward health and well-being. In short, adaptability, communication and stress management are seen as key skills for software engineers nowadays. Yet, such skills are not developed through logic and algebraic reasoning alone; they involve *soft areas* of intuition, feelings and senses.

In this study, the most prominent personality type was a combination of extroversion, sensing, thinking and judging. For example, ESTJs are known as being practical and realistic individuals; they lead people and make things happen and, thus, are more likely to rise to management positions. At present, planning, management and analysis are more dominant tasks than programming, and client-developer interaction is also required. Even selected software development methodologies tend to be agile, which means that programmers must be communicative and receptive. It is, therefore, possible that future studies will show extroverts more widely distributed than introverts in the software industry.

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BIOGRAPHIES

Daniel Varona received his Engineering in Informatics Sciences degree from the University of Informatics Sciences Havana, Cuba, in 2008. His current research interests include software engineering (SE), human factors in SE, software project management, adaption of software development methodologies to specific environments and social impact of software products. He is currently a faculty member at the University of Informatics Sciences Havana, Cuba.

Luiz Fernando Capretz has more than 30 years of international experience in the software engineering field as a practitioner, manager and educator. Having worked in Brazil, Argentina, UK, Japan, Italy and the UAE, he is currently an Assistant Dean (IT and e-Learning) at the University of Western Ontario, London, Ontario, Canada. He has published more than 100 peer-reviewed research papers on software engineering in leading international journals and conference proceedings, and has co-authored two books in the field. His present research interests include software engineering (SE), human factors in software engineering, software estimation, software product lines and software engineering education. Dr Capretz received his PhD in Computing Science from the University of Newcastle upon Tyne (UK), his MSc in Applied Computing from the National Institute for Space Research (INPE, Brazil), and his BSc in Computer Science from State University of Campinas (UNICAMP, Brazil). He is an IEEE senior member, ACM member, MBTI certified practitioner and a Professional Engineer in Ontario, Canada.

Yadenis Piñero received her MSc in 2008 in Informatics Project Management from the University of Informatics Sciences Havana, Cuba; and her Informatics Engineering degree from the Higher Polytechnic Institute, Havana, Cuba. She has authored and co-authored several research articles in conference proceedings in the area of software engineering. Her current research interests include empirical investigation regarding human factors in informatics, project management and assessment of human resources competencies. She is a professor at the University of Informatics Sciences Havana, in Cuba.