Citizen Language: Color and Accessibility

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ABSTRACT
Colors make some aspects of business process models understandability easier. Although papers confirm this claim, they did not deal with color-blind people. Some notations even prohibit the use of colors. Accessibility studies have demonstrated safe colors, enabling wide understandability. This work proposes the use of safe colors for graphic processes represented in Citizen Languages, improving its mandatory transparency.

Author Keywords
Process model; color; accessibility; Citizen Language

ACM Classification Keywords
H.5; H.5.2 (User Interfaces). K.4; K.4.2 (Social Issues). D.4; D.4.1 (Process Management).

INTRODUCTION
Colors, in a diagram, are used to inform, reference or decorate [1]; resulting in the effect of association, aggregation, order and quantity [2]. The understanding of business process models, such as diagrams, can be improved using colors [3][4][5], since they are detected with greater accuracy and speed and help effectiveness of communication [3]. Colors, however, are sensitive to context and audience.

In relation to business processes, (i) context: colors are sensitive to culture [6], can inherently carry information, altering a priori understanding; (ii) audience: the color absorption is different among the population. It is estimated that worldwide 8.5% of men and 0.5% of women are hereditarily visually color-blind [7], in Brazil two million citizens are born or discover, per year, this pathology; it can impair human development by acting on the intellectual and emotional aspects [8].

The use of colors in process diagrams may be determined by business process modeling notations compliance or modeler's choices. In the first case, the Unified Modeling Language (UML) only allows the use of black and white [3][5]; while the Business Process Model and Notation (BPMN) allows the use of colors [9]. Each of the extremes presents some problems, but in both, colors are used to facilitate the understanding.

In Brazil, Law 12.527, Law on Access to Information (LAI) (Brazil, 2011) makes transparency of public data mandatory by public agencies. Government determines the alignment of transparency with the principles of the Citizen Language, saying: “It is clear, concise, objective, non-bureaucratized. More than that, it is the one that looks at the sociocultural context of the person to whom it is addressed, adapting to their needs” (Brazil, 2015). Considering that the correct use of colors facilitates the understanding of business process models and that LAI and government stipulate attention to the sociocultural context of the audience, it seems to be relevant the use of colors in diagrams.

Carvalho (2016) proposes the use of colors to translate models built in BPMN into Citizen Language. This work associates roles and activities through the use of colors (Figure 1); Cunha (2017) translated ConDec declarative models into Citizen Language too, using the same principles. Problems are: (i) Carvalho (2016) stimulates the use of colors, without determining which; (ii) in both [10] [11], the color usage is free and unfounded, without considering that the target audience may be color blind. Neglecting the audience negatively affects understanding and it is in disarray with the principle of Citizen Language described in law [16].

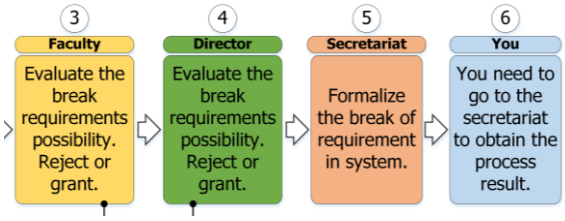

Figure 1: Excerpt of process model [10]

The purpose of this work is to investigate the color use in business process models and accessibility, according to graphic quality derived from Citizen Language concepts.

COLOR BLINDNESS AND ACCESSIBILITY
Color blindness is the difficulty in distinguishing colors or some of them. It is a congenital deficiency divided into three main categories: Monochromacy; Anomalous Trichromacy; Dichromacy. Given the space constraint, they are detailed in Color Blind Awareness (2018).

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Accessibility refers to the design of products, devices, services, or environments for people who experience disabilities [13]. Even if process notations, in its concrete syntax [5], do not stipulate compulsory use of colors (or prohibition), they can at least present a safe color guide.

PROPOSAL

Krogstie (2016), in a related work, discusses the color use in process modeling but does not address safety colors, recommending that the color use is linked to notation and not free in the act of modeling **(**as a modeler decision**)**.

The objective of this work is reached using the artifacts exposed in two researches on safety colors (Coady, 2013), suggesting these colors for model building. The product of one of them is depicted in Figure 2.

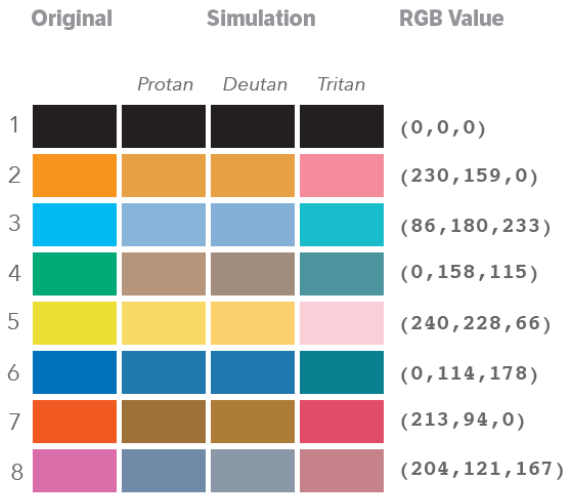

Figure 2: Set of colors that are unambiguous to both color blind and non-color blind [14]

Colors, in business process models, are referential rather than informational [1]. They operationalize communication effects, aiding in the informational act [2]. Color-blind people with tritanopia cannot absorb the color with the desired efficacy, as seen in Figure 2, but they effectively perform their referential function, fulfilling their purpose.

Figure 2 presents adequate colors for construction of transparent and effective communication with Citizen Language, respecting the color-blind people rights to qualified information.

If few colors are needed, it is recommended to choose gray scale [5]; nevertheless, if the diagram is printed, it may become unreadable in this option.

CONCLUSION

Business processes notations can have their understanding favored from the use of colors with conscience and quality, respecting the right to information. This work merge accessibility and construction of informational artifacts to assist in the advancement of informational democracy, guaranteeing quality of information for a wider audience.

As future work it is proposed the revision of color standards for Citizens' Languages of processes.

REFERENCES

Online references available in 08/03/2018.

1. Jörg von Engelhardt. 2002. The language of graphics. Dissertation. University of Amsterdam.
2. Jacques Bertin. 1983. Semiology of Graphics: Diagrams, Networks, Maps. University of Wisconsin.
3. Daniel Moody. 2009. The “Physics” of notations. IEEE Trans. Softw. Eng. 35.
4. Kathrin Figl, Jan Recker, Jan Mendling. 2013. A study on the effects of routing symbol design on process model comprehension. Decision Sup. Systems, 54(2).
5. John Krogstie. 2016. Quality in Business Process Modeling. Switzerland. Springer.
6. Tyge-F. Kummer, Jan Recker, Jan Mendling. 2016. Enhancing understandability of process models through cultural-dependent color adjustments. Dec. Sup. Sys., 87(1).
7. Adolf Cassan. 2010. Daltonismo: ceguera as los colores. Salud – Previnir y Curar, 77. Barcelona. (in Spanish).
8. John Adão, Marcos Martins. 2017. O Aplicativo Daltônico. In: https://goo.gl/VWpE82 (in Portuguese).
9. OMG. 2014. BPMN. Available 07/03/2018 in: https://www.omg.org/spec/BPMN/2.0/About-BPMN/
10. Luiz Paulo Carvalho, Flávia S., Claudia C. 2016. Using a citizen language in public process models: the case study of a Brazilian university. EGOVIS’16. Portugal.
11. Lilian Cunha. 2017. Uma investigação sobre o entendimento de processos públicos pelo cidadão com uma notação de processo declarativo. Master degree dissertation. UNIRIO, Brazil (in Portuguese).
12. Color Blind Awareness. 2018. Types of Colour In: https://goo.gl/45wbtf
13. Shawn Henry, Shadi Abou-Zahra, Judy Brewer. 2014. The Role of Accessibility in a Universal Web. W4A '14. Article No. 17. Korea.
14. Geri Coady. 2013. A Pocket Guide to Colour Accessibility. Studio Two, The Coach House. United Kingdom.
15. Priscila Engiel. 2012. Projetando o entendimento de modelos de processos de prestação de serviços públicos. Master degree dissertation. UNIRIO, Brazil (in Portuguese).
16. Brazil. 2011. Lei nº 12.527. Lei de Acesso à Informação (LAI). In: https://goo.gl/yfTAja (in Portuguese).
17. Brazil. 2015. Instrução Normativa Nº 01 da Ouvidoria-geral da União da Controladoria-Geral da União. In: https://goo.gl/L9fJQA (in Portuguese).