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Notation standards for reports, presentations and dashboards What we can learn from engineers and musicians

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ABSTRACT

Engineers, musicians, architects and many other professions are lucky: They can record their ideas on paper using a visual notation that has been globally accepted for decades - even centuries in the case of musicians. And they can be sure that the reader will understand it. We at business management have missed this opportunity so far. If we want to establish such a notation, we first have to remove what has emerged from individual controller best practices, creative corporate design guidelines and well-meant software functionalities. This is a challenge that the IBCS Association is taking up with the public discussion and further development of report notation standards.

Classification JEL: MO, Z0

KEYWORDS

Notation standards, IBCS, Visual Notation, Dashboards, Reports, Presentations.

RESUMEN

Los ingenieros, músicos, arquitectos y muchas otras profesiones tienen suerte: pueden registrar sus ideas en papel utilizando una notación visual que ha sido aceptada mundialmente durante décadas, incluso siglos en el caso de los músicos. Y pueden estar seguros de que el lector lo entenderá. En gestión empresarial hemos perdido esta oportunidad hasta ahora. Si queremos establecer dicha notación, primero tenemos que eliminar lo que ha surgido de las mejores prácticas de los controllers, las pautas de diseño corporativo creativo y las funcionalidades de software bien intencionadas. Este es un desafío que la Asociación IBCS está asumiendo con la discusión pública y el desarrollo de los estándares de notación de informes.

Clasificación JEL: MO, Z0

PALABRAS CLAVE

Estándares de notación, IBCS, Notación visual, Cuadros de mando, Informes, Presentaciones.

The quality of a report is measured by how well we understand its content

Managers, management accountants and Business Intelligence professionals sometimes talk about *good* dashboards or *good* reports. But how can we measure the quality of a report?

Some people judge according to optical criteria such as page layout and color design – and they are wrong. We should measure the quality of a report by its content but not by his decorative appearance. A good report shows the exciting result of a successful analysis, conveys an interesting

message. Just like the quality of a construction is measured by the architectural finesse of the building but not by the appearance of the building plan. And the quality of a piece of music is measured by the sound of the music but not by the appearance of the musical text. Sounds obvious? Then the effort and creativity in creating reports should flow into the presentation of interesting analyses and messages, not into the most visually appealing way to present them.

In addition, we should also measure the quality of a report by how well and how quickly it succeeds in conveying a desired message from the sender to the recipient. After all, reports, presentations, and dashboards are corporate communication media, and communication is what reaches the recipient.

However, if the quality of a report is not primarily measured by its appearance, then the occasional objection that a standardized notation would limit the design freedom of business analysts and dashboard designers is not true. On the contrary: It would be welcome if they could concentrate on the content of their reports and how to convey it, instead of having to think anew each time how to get the content on paper or on the screen. Or have you ever heard of an electrical engineer who feels restricted in his creative freedom by the standardized notation of circuit diagrams?

Notation standards facilitate the creation and understanding of reports

Regardless of the discipline, a standardized notation is about patterns and their recognition. The productivity of Mozart who – although he died at the young age of 36 – composed 21 operas, 18 masses, 17 church sonatas, 44 symphonies, 27 piano concertos, 54 other orchestral works, more than 50 sonatas and numerous other individual pieces would have been completely impossible without the notation of music he was familiar with. And the receiving counterpart – says a pianist – would not have the slightest chance of sight reading one of Mozart's piano sonatas if he could not rely on his visual pattern recognition, but had to decipher Mozart's music tone by tone.

Obviously the use of a standardized notation speeds up both the creation and the understanding of messages of whatever kind. This results in time and cost advantages for both the sender and the recipient. But that's not all: The use of a standardized notation also reduces the risk of misunderstandings. The quality of communication increases because the error rate decreases. In Mozart's case, a communication error would "only" lead to a wrong tone in the concert. The consequences of a wrong decision in management would probably be much harder.

When looking at the creation of a dashboard, for example, the benefits of a notation standard can be described as follows:

- **Better quality:** By using the standard notation, all charts and tables have a uniform design, regardless of the developer. When using the templates provided within the standard (see Figure 2), also best practices flow into the dashboard development.
- **Shorter response times:** By using existing notation standards and templates, you don't have to think about the design for each new dashboard and can therefore deliver faster.
- **Reduced costs:** The number of dashboard layouts, charts and tables can be reduced, resulting in further cost advantages in addition to faster creation.

Considering the obvious quality, time and cost benefits at all levels of the decision-making process, from the dashboard developer to the analyst to the manager, we ask ourselves why there is still no generally accepted standard notation for business reports.

The time is ripe for a visual language in business management

We could argue that business administration is a young discipline that emerged around 1900 with the establishment of corresponding business schools. But this is too easy. After all, some kind of business schools already existed in the time of the pharaohs, where in addition to writing and arithmetic, they also taught payment processing and bookkeeping. And actually there are first approaches of a standardized notation in business management that we know for centuries. Just think of the bar charts and line charts that have been invented by William Playfair in the 18th century. We just have to pursue these approaches consistently.

Willard C. Brinton wrote already in 1914 in his book Graphic Methods for Presenting Facts: "*The trouble at present is that there are no standards by which graphic presentations can be prepared in accordance with definite rules so that their interpretation by the reader may be both rapid and accurate. […]. The principles for a grammar of graphic presentation are so simple that a remarkably small number of rules would be sufficient to give a universal language. It is interesting to note, also, that there are possibilities of the graphic presentation becoming an international language, like music, which is now written by such standard methods that sheet music may be played in any country*" [Bri1914, S. 3].

Perhaps it is due to the lack of technical support of computers and software at Brinton's time that it took another 80 years before authors such

as Gene Zelazny [Zel02], Edward Tufte [Tuf90] and Stephen Few [Few04] begun to deal more intensively with the visualization of data. But the information technology now available was both a blessing and a curse. As a result of not yet existing notation standards, the providers of *reporting* software such as Microsoft Excel decided how business charts should look like. And we, the business people, can by no means complain about this. We should have told the software creators how we want the reports and dashboards to look like. Just as the musicians have told the software creators how sheet music should look like. But we haven't.

At least, Zelazny, Tufte, Few and many others have succeeded in establishing basic concepts for the selection of chart types, the avoidance of clutter and the application of correct scaling in the charts. However, when looking at the reports and dashboards we face today, we must note that many of these rules are still not being observed. Why is that? We realized, that there is a major difference between recording the ideas of musicians, engineers, architects and many other professions on paper and the way business management is doing it: Musicians, engineers and architects have learnt a visual language which they use without thinking on it. They just apply it as they have been taught. In business management we do not have such a visual language yet. We only have a set of perceptual rules set forth by Edward Tufte and others, and we must never cease to think of complying with it. Wouldn't it be great if we could also use a previously learned notation and not have to worry too much about rules of perception because the visual language already follows them?

Adding a new aspect to the existing perceptual rules could finally lead to such a visual language in business communication: Let us introduce the idea of *semantic notation*.

Semantic notation completes the established design rules for reports

The idea to provide business charts and tables with a semantic notation goes back to Rolf Hichert [HiFa19]. As a trained engineer, he never understood why even his former consulting colleagues at McKinsey did not use a standardized language of forms and symbols. He found that "things that mean the same should also look the same. And things that don't mean the same thing should never look the same". What sounds so obvious is by no means true in practice. Today even fundamentally different things as historical data (actual) and fictitious data (plan) are not distinguishable by their visual appearance.

We want to illustrate the new concept of semantic notation with a little example:

Step 1: Basic column chart showing a time series

Let's say we want to present the monthly net sales of Alpha Corporation from January to July 2019 and the expected development to the end of the year. First we suggest to consistently showing a standardized title in the upper left corner of every chart and table. It indicates the organizational unit, the business measure and its unit of measurement, and the time period. Then we add a chart displaying seven monthly columns with a dark solid fill. This semantic notation indicates that the columns show actual data (AC) of the corresponding months. The columns of the remaining five months show forecasted data (FC) indicated by a hatched fill (see Figure 1).

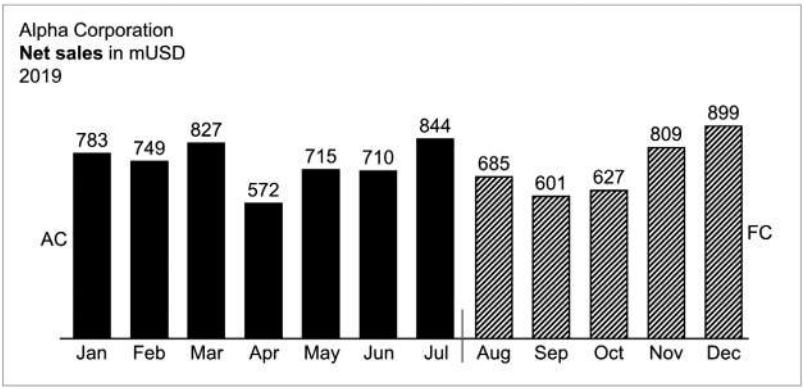

Figure 1. Standardized chart title and semantic notation of actual and forecasted data.

Step 2: Comparing actual and forecasted data to plan and previous year

Now we want to compare the monthly net sales and the expected future development with the corresponding plan figures and the previous year. We position plan columns to the left behind, and overlapped by, the actual columns. Overlapped, because fitting a complete column beside the actual column requires adjusting the category width, which we want to avoid. Behind, because the actual data is more important to us. And to the left, because the plan was created before the actual data. In order to immediately recognize

the reference columns as a plan, we use semantic scenario notation and draw them outlined. For showing the previous year (PY) we advise against a further column, because this would easily become messy and spill over the category width. Instead, we propose reducing the previous year to small triangles marking the height of a virtual third column. We use the surface of these triangles again for the semantic scenario notation and draw them in gray indicating previous year (Figure 2).

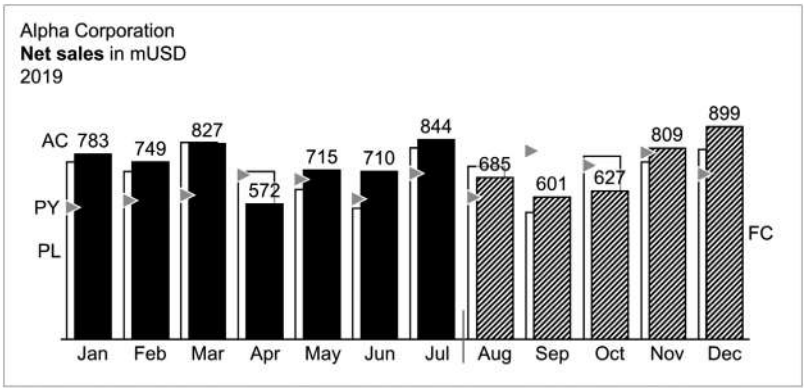

Figure 2. Semantic notation of reference columns (PL) and reference triangles (PY).

Step 3: Adding variances

Now we are interested in the variances. We show the variances on a second tier above the original chart. Variances with a positive effect on our corporate goal are displayed in green color and get a plus sign. Variances with a negative effect are correspondingly red. For variance charts, the x-axis bears the semantic notation of the reference scenario, in this case an "outlined" axis indicating we are comparing to PL. The scale of the variances is of course identical to the scale of the base numbers. By combining the variances to a variance waterfall, we do not only see the monthly variances but also get an impression of the accumulated variance year-to-date. Finally we would supplement the absolute figures with a relative variance chart on a further tier. We use pins instead of columns to indicate *relative* variances. The pinheads carry the semantic scenario notation, i.e. solid for AC and hatched for FC (Figure 3).

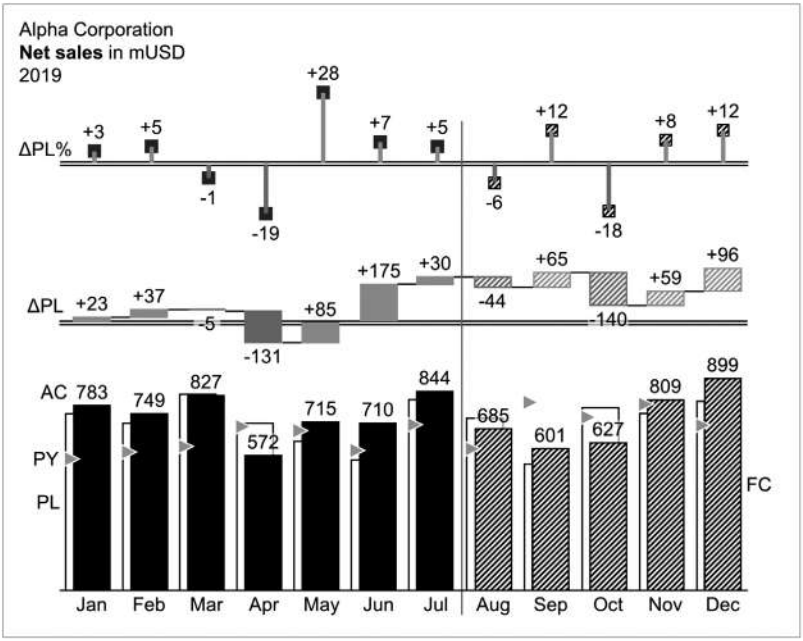

Figure 3. Green and red for good and bad variances, pins for relative variances.

Step 4: Adding annual figures

When looking at the twelve monthly figures presented in Figure 3, managers wanting to adhere to a budget will inevitably ask what the monthly variances mean for the year as a whole. Accumulating the 12 monthly values would require a substantially larger scale. As a result, the individual monthly values get very small, and their variances even more so.

An extension of the original chart scaled to the average of the monthly values solves this problem. This single column on the right comprises actual and forecast data, preceded by the reference column with the average monthly plan. Instead of labelling this column with the average monthly figures we label it with the annual figures and use a scaling aid to indicate that the annual column uses a different scale. The annual column is wider than the monthly columns because it is positioned in an annual category on the x-axis that is wider than the monthly categories (Figure 4).

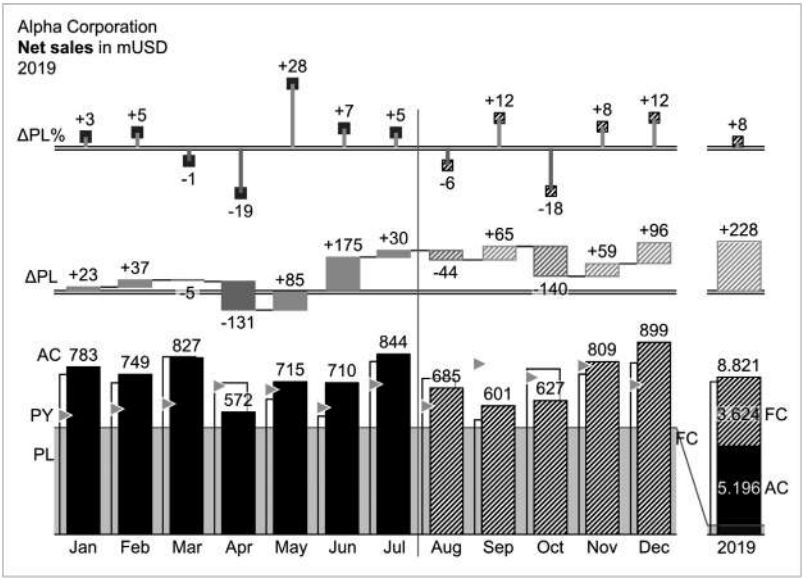

Figure 4. Annual columns in wider categories and a different scale indicated by a scaling aid.

Conclusion: International Business Communication Standards

Figures 1 to 4 show some examples of a semantic notation. Once we accept that things that mean the same should also look the same, the question arises *how* they should look and *who* decides on it. Since there is no natural law for the appearance of e.g. plan data, all parties must agree on a common convention. Rolf Hichert has made some proposals for the visualization of basic topics and developed corresponding templates. He has then transferred his intellectual property into the *International Business Communication Standards (IBCS)* project governed by the non-profit IBCS Association [IBCS]. These standards are publicly available free of charge under a Creative Commons license (www.ibcs.com/standards).

Today we can say that the IBCS project works: The IBCS Association with over 3500 members has released version 1.1 of the IBCS Standards. The IBCS Institute has trained thousands of management accountants and BI consultants, about 100 of them even certified. SAP not only positioned IBCS in the thought leadership channel of their online learning platform openSAP, but also built IBCS functionality into the SAP Analytics Cloud – as do many other providers of IBCS-certified software. Maybe we will

manage to develop and establish notation standards for reports and presentations after all.

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