FASTER INSIGHTS, BETTER UNDERSTANDING

EVIDENCE FROM AN EMPIRICAL STUDY ON THE EFFECTIVENESS OF ISO 24896 NOTATION FOR BUSINESS REPORTING

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TABLE OF CONTENTS

1 EXECUTIVE SUMMARY: KEY FINDINGS 3

2 RESEARCH OBJECTIVE 4
2.1 Purpose 4
2.2 Hypotheses 4
3 STUDY DESIGN 5
4 METHODOLOGY: MEASUREMENT AND DATA PREPARATION 7
4.1 Measures 7
4.2 Interruptions in an unsupervised study 7
4.3 A worked example 8
4.4 Exclusion criteria and resulting sample 8
4.5 Significance testing 8
4.6 Limits of the approach 9
5 PARTICIPANT CHARACTERISTICS 10
5.1 Role level and experience 10
5.2 Function 11
5.3 Working location 11
5.4 Familiarity with standardized reporting notation 11
6 RESULTS: SPEED, ACCURACY, AND USER FRICTION 12
6.1 Results by report type 12
6.2 Differences between participant characteristics 15
6.3 Limitations 19
7 IMPLICATIONS FOR BUSINESS REPORTING AND DECISION-MAKING 20
8 CONCLUSION 21
9 RECOMMENDATIONS FOR ORGANIZATIONS 21

APPENDICES 23
TABLE OF FIGURES 24
TABLE OF TABLES 24
LICENSE AND STUDY INFORMATION 25
IMPRINT 25

1 EXECUTIVE SUMMARY: KEY FINDINGS

Management reports often follow individual visual conventions, so the same color, chart type, or label can mean different things from one report to the next. Readers must first decode the format before they can grasp the business message, which costs time and invites misinterpretation. ISO 24896 addresses this with a standardized notation that gives consistent visual meaning to recurring business concepts such as actuals, plans, forecasts, variances, and time comparisons.

In a controlled online experiment, 1 004 business professionals were randomly assigned to either the original or the ISO 24896-compliant version of the same Sales and Finance reports, Complaint Management dashboards, or isolated notation rules (Single Rules) and answered identical questions. The study measured completion time, accuracy, and user friction (unanswered questions and dropouts). The result is clear: ISO 24896 reports were understood faster across all report types and, in complete business reports, also more accurately. Five findings support this:

Faster understanding across all report types. Completion time fell by 47.8% (Sales and Finance), 21.6% (Complaint Management), and 16.5% (Single Rules), all highly significant. Across the three Sales and Finance reports, participants saved approximately five minutes in total.

Fewer errors in complete business reports. Errors fell by 52.7% (Sales and Finance) and 26.5% (Complaint Management), both statistically significant. About 25% of the participants working with the ISO 24896-compliant Sales and Finance reports made no errors at all. For the simpler Single Rules, the 28.4% reduction is not significant.

Less friction in demanding tasks. In Sales and Finance, the dropout rate fell from 22.6% (original) to 13.2% (ISO 24896). On the most complex Complaint Management question, users of the original report were more than twice as likely to leave it unanswered. Across all report types combined, the dropout difference is not significant.

Benefits that transfer across business domains. The advantage of ISO 24896 held for Complaint Management reports as well as for Sales and Finance reports, with smaller effects in the domain that participants knew less well.

Greatest gains for domain experts and senior decision-makers. On the Sales and Finance reports, participants from Finance/Controlling achieved the largest improvements, and Top Management participants reduced their processing time by 53.4% and their errors by 69.9%. The notation appears to amplify existing domain expertise.

These gains were achieved by participants largely unfamiliar with the notation: only 26% had been trained, and the ISO 24896 group received just a three-minute introduction, which indicates that even limited onboarding can support an effective implementation.

For organizations, standardized notation turns visual consistency into measurable performance: readers spend less effort decoding the format and more attention on the business message, giving management decisions a faster and more reliable basis. The study measured the information-processing stage that precedes decisions, not decision quality itself. The benefit is largest in complex, decision-relevant reports and grows with organizational scale, where inconsistent conventions across functions, countries, and BI platforms multiply interpretation effort. ISO 24896 is therefore a matter of reporting governance, not individual report design.

Organizations should build it as a lasting capability rather than a one-time redesign: define a common notation, audit the reporting landscape, embed the rules in BI templates and reusable components, train report creators and users, measure reporting quality by user performance rather than visual preference, and anchor the standard in a governance shared by Finance, Controlling, BI, and IT.

2 RESEARCH OBJECTIVE

The empirical evaluation of ISO 24896 is guided by a clearly defined purpose leading to four research hypotheses addressing the speed, accuracy, and transferability of business report comprehension as well as reduced user friction.

2.1 Purpose

The purpose of this study is to test whether standardized business reporting notation creates measurable performance benefits for report users. More specifically, the study examines whether ISO 24896-based reports help users identify, understand, and interpret business information **faster, more accurately, and with less friction** than original report designs.

ISO 24896 defines a standardized visual notation for business reporting, based on the notation principles proposed by the IBCS Association as part of the International Business Communication Standards (IBCS). Its purpose is to make reports easier to read by assigning consistent visual meaning to recurring business concepts such as actuals, plans, forecasts, variances, and time comparisons. When the visual language is consistent, users can focus on what the data means, rather than how to interpret the report.

This study examines whether that promise can be demonstrated empirically. It compares ISO 24896-based report designs with original real-world, non-standardized report versions. The study covers several realistic reporting scenarios, including Sales and Finance reports and Complaint Management dashboards. Additionally, we tested Single Rules of ISO 24896 for charts and tables to understand their specific, isolated effects.

The findings are intended to support organizations that want to improve the effectiveness of their reporting landscape by implementing a common reporting notation that turns dashboards and management reports into clearer, faster, and more scalable communication tools.

2.2 Hypotheses

The main research question is: Does the application of ISO 24896 notation lead to measurable improvements in the speed and quality of business report comprehension?

The corresponding hypotheses are as follows:

H1 Faster understanding: Users understand ISO 24896-compliant reports faster than original, non-standardized versions.

H2 Better understanding: Users interpret ISO 24896-compliant reports more accurately than original, non-standardized versions.

H3 Transferability across report types: The benefits of ISO 24896 notation can be observed across different reporting contexts.

In addition, the study captures user friction by measuring task abandonment rates, using early discontinuation as a behavioral indicator of whether participants found the reporting tasks too demanding, unclear, or insufficiently engaging. This leads to a fourth hypothesis:

H4 Reduced user friction: Participants working with ISO 24896-compliant reports show lower task abandonment rates than participants working with original, non-standardized versions.

Together, these four hypotheses reflect the assumption that standardized visual notation reduces cognitive effort and improves the efficiency of business information processing. If confirmed, the results would provide empirical support for the use of ISO 24896 as a practical standard for improving management reporting, dashboard design, and business communication.

3 STUDY DESIGN

The study used a controlled, task-based experimental design to measure whether standardized business reporting improves user performance. Participants were asked to complete interpretation tasks based on business reports and dashboards. The core comparison was between reports designed according to ISO 24896 notation and corresponding original control versions.

The study process consisted of three phases: onboarding, task completion, and a closing questionnaire.

Onboarding
During the onboarding phase, participants accessed the study via a landing page and received an introductory briefing to ensure that they understood the task format before starting the reporting exercises. Participants were randomly assigned to different study paths. Participants assigned to a path involving ISO 24896 notation received an additional three-minute instructional video introducing seven main principles of the notation. Like any standard (traffic signs or music sheets, for example), the notation requires a short briefing before people can work with it properly and effectively. We therefore assume that comparable short training is given when people start working with reports that follow the ISO 24896 standard.

Task completion
Subsequently, all participants completed a sequence of interpretation tasks. The task material covered three reporting contexts: Sales and Finance, Complaint Management, and the isolated Single Rules.

The **Sales and Finance** tasks required participants to analyze income statements and sales reports, identify performance drivers, interpret actual-versus-budget and year-over-year variances, and explain business results.

The **Complaint Management** tasks focused on dashboard-based analyses of complaint trends, target deviations, prioritization, and operational decision-making.

The **Single Rules** tasks tested individual notation principles in simplified charts and tables, covering topics such as scaling, variances, scenario types, time direction, and integrated labels. This structure allowed the study to test the effect of standardized notation both in complete reporting environments and in focused visual interpretation tasks.

For each reporting context, the study compared standardized report versions with original, non-standardized control versions. The standardized versions followed ISO 24896 notation, whereas the control versions were based on real-world report designs provided for the study and did not follow the same standardized visual principles. To ensure a fair comparison, both versions used identical data, the same number of data points, business context, questions, and correct answers. Participants answered single-select, multiple-select, and ranking questions, with a "no answer" option available to discourage guessing.

Closing
The study concluded with a post-study questionnaire designed to capture participant characteristics and contextual factors, including professional function, organizational role level, business experience, familiarity with ISO 24896 requirements through IBCS, and country of work. In addition, participants were asked to self-assess their confidence, motivation, concentration, and general state during the study, providing supporting context for interpreting task performance, completion behavior, and potential differences between participant groups.

Faster Insights, Better Understanding (ISO 24896)

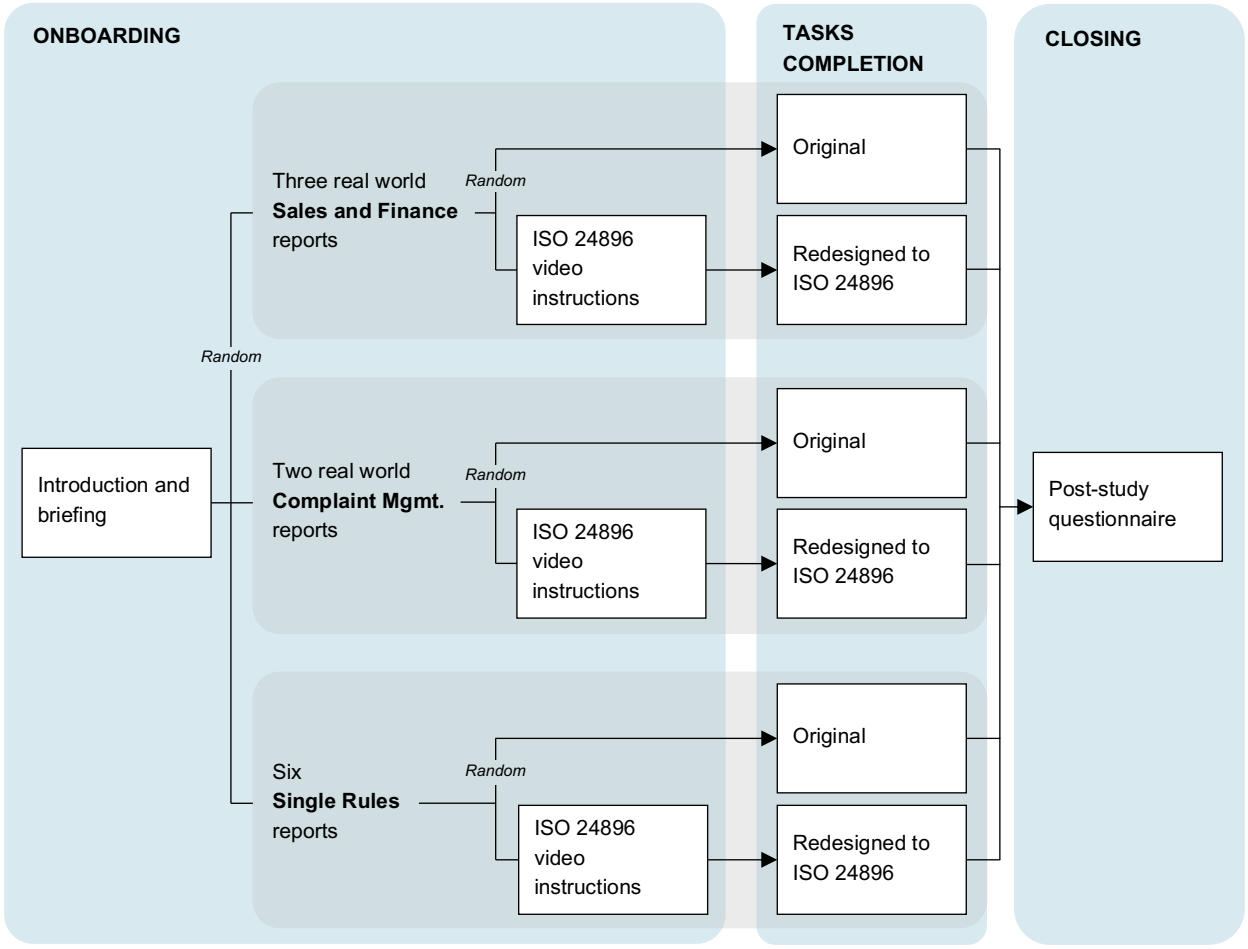

Figure 1: How we measured reporting performance

Overall, the study was designed to move the discussion about reporting standards from visual preference to measurable business performance.

4 METHODOLOGY: MEASUREMENT AND DATA PREPARATION

The study measured task completion time and answer accuracy for every participant. The rules for handling interrupted measurements were fixed before any result was examined and applied identically to both report versions. *This chapter documents the statistical treatment in detail; readers mainly interested in the results can continue directly with chapter 5.*

4.1 Measures

Task completion time was recorded by the survey platform for every screen a participant saw, from the briefing that introduced each report to each subsequent question. This produced 35 timed screens, measured in seconds, across eleven report and briefing blocks.

Answer accuracy was recorded per question as correct or incorrect.

User friction was captured through two behavioral indicators: questions left unanswered, and discontinuation of the study before all assigned tasks were completed.

Each participant was assigned to exactly one condition, ISO 24896-compliant or original, within one of the three streams. The design is therefore between-subjects, and every comparison is made per task between the two conditions.

4.2 Interruptions in an unsupervised study

An online study measures two things at the same time: how long a participant needs to understand a report, and how long that participant happens to sit in front of it, and the timer cannot tell the difference. The longest single task time in the raw data was 17 208 seconds, close to five hours on one question.

Because hypothesis H1 and, in part, hypothesis H3 rest on time data, the rule for handling such values was fixed before inspecting its effect on the results.

Completion times never fall below zero, cluster at the lower end of the scale, and stretch out towards long durations. On a distribution of this shape, the familiar approach of adding and subtracting two standard deviations from the average returns a lower limit below zero, which is not a possible duration. The established practice in response-time research is to work on the logarithm of the recorded times, a scale on which the distribution becomes approximately symmetric, and to convert the results back into seconds as the final step. The average obtained in this way is the geometric mean, which is far less distorted by a few extremely long times than the ordinary average, and it is the figure reported as average processing time throughout this study.

For every timed screen, and separately for each of the two conditions, plausibility limits were set two standard deviations below and above that average, translated back into seconds, and measurements outside them were treated as implausible. Two parameters were fixed in advance: the confidence level of 95 percent (corresponding to a p-value of 0.05) and the width of the limits, at two standard deviations.

Because the limits are derived per screen and per condition, the procedure yields 70 reference distributions, and neither group is judged against the spread of the other. Screening happens at the level of the individual measurement rather than the participant, so a single interruption removes one measurement and leaves the rest of a record in the analysis. Only measured times enter the calculation, so nothing is estimated or filled in.

4.3 A worked example

The first question on the Income Statement report shows what the rule does in practice. Each condition is measured against its own distribution.

Income Statement, question 1	Original	ISO 24896
Measured times (n)	194	159
Average time in s (geometric mean)	106.8	55.7
Lower plausibility limit in s	13.0	11.3
Upper plausibility limit in s	879.9	273.1

Table 1: Average times and plausibility limits, Income Statement question 1

The upper limit in the original condition corresponds to almost fifteen minutes on a single question. The rule is deliberately generous, because its purpose is limited to removing sessions in which the participant stopped working.

4.4 Exclusion criteria and resulting sample

Exclusions were applied at two levels, and keeping them apart is what makes the procedure verifiable. Record level decides whether a session is usable at all, observation level whether a single measurement inside a valid session is plausible.

Five criteria were applied at record level, before any analysis of completion times:

- Sessions without any answer, where participants may have read the briefings but never responded.
- Internal test records created by the research team while building and validating the instrument.
- Duplicate submissions, since a second exposure to the same report is no longer a first-time comprehension measurement.
- Sessions in which every recorded time was implausible, which points to a session left open while the participant did something else.
- Dropouts, meaning participants who completed less than 50 percent of their assigned tasks.

The four criteria mentioned first reduced 1 046 raw records to 1 004. With the fifth criterion applied, we had to take out another 161 participants. This is the sample size the statistical outcomes are based on in this study: 843 valid participants, 443 in the original condition and 400 in the ISO 24896-compliant condition. Dropout behavior itself is not discarded: it is reported as a result under hypothesis H4, because early discontinuation is a behavioral indicator of friction.

At observation level, the plausibility limits were applied to the 9 967 timed observations of the valid sample. 386 observations, or 3.9%, fell outside their limits and were excluded from the statistics of the screen concerned, 283 of them above the upper limit and 103 below the lower one. The rates are close in both conditions, at 4.0% in the original condition and 3.8% in the ISO 24896-compliant condition. Within the retained sample, 615 of the 843 participants have no flagged measurement at all. The screening corrects individual interrupted measurements and leaves the composition of the sample intact.

4.5 Significance testing

The differences reported in chapter 6 are supported by statistical tests. In every comparison the two groups are independent of one another, because each participant saw either the ISO 24896-compliant version of a report or the original version. The instrument for such a design is the two-sample t-test for independent samples, in the variant that allows for unequal variances, known as Welch's t-test.

The conditions are of unequal size, with 443 participants against 400 and considerably smaller numbers once a comparison is made per report and per task, and the spread of the values also differs, as the standardized version narrows the range of completion times while it shifts the average. Welch's t-test accounts for both, and it remains robust against moderate departures from a normal distribution, which matters for behavioral data collected outside a laboratory.

Completion times entered the test on the logarithmic scale described above, so that the resulting probability value refers to the ratio between the two averages. Accuracy entered as a score per participant: every task was scored as the percentage of correct answers, the task scores were aggregated per report with a weight reflecting the number of answers each task contained, and a final aggregation produced one score per participant for each stream. The comparison was run at task, report, and stream level.

In simple terms, the *p*-value indicates how likely it is that a difference of the observed size would occur by chance alone if ISO 24896 had no effect. The significance level was fixed in advance at a p-value of 0.05. A difference is reported as significant when the *p*-value falls below 0.05 and as highly significant when it falls below 0.001. Where a difference does not reach the threshold, we state this explicitly and report the probability value. All tests are two-tailed, which is the more demanding option given that hypotheses H1 and H2 predict a direction.

4.6 Limits of the approach

Three properties of this treatment limit how far it can carry. The first is the width of the limits, which is stricter than the three standard deviations commonly used in response-time research. It was chosen deliberately, because interruptions in an unsupervised setting are both frequent and long, and the trade-off is visible in the numbers: at two standard deviations the rule removes 3.9% of observations, at three it would remove 1.3% and leave a substantial part of the interruption noise in the data.

The second is that the limits are derived from the observed distribution of the same data they screen. That circularity is inherent to every rule of this type, and it is contained by applying an identical rule to every screen and both conditions, by deriving the limits before any record-level exclusion, and by fixing their width before inspecting any effect.

The third is that interruptions shorter than the upper limit remain invisible. The residual noise makes statistical significance harder to reach in both conditions, so the effects reported in chapter 6 are conservative.

Taken together, these properties argue for reading the results as a pattern. No correction was applied for the number of comparisons, so an individual borderline result among 35 timed screens can be a false positive, and the interpretation in chapter 6 rests on the consistent direction across reports and tasks rather than on any single task. That direction does not depend on the screening: across the 24 question screens it is identical with and without the rule, and 23 of the 24 favor the ISO 24896-compliant version in both variants. The screening also removes a marginally larger share of observations from the original condition, 4.0% against 3.8%, and 73% of all removals are long times, so it works against the measured advantage of ISO 24896 instead of producing it.

5 PARTICIPANT CHARACTERISTICS

With participants from different role levels, functions, and countries, the study sample was professionally diverse, and not arbitrary. Of the 1 004 participants, up to **825 answered** the demographic questions summarized below. The n-value stated for each question refers to those who answered, non-responses are reported separately. Participants were randomly allocated to the ISO 24896 and control paths; because they could skip questions or discontinue at any point, the number of valid responses varies across questions and tasks, and incomplete datasets were kept where they contributed valid task-level responses (unless participants hit at least one of our five exclusion criteria listed in chapter 4.4). Full distributions are shown in the accompanying figures. Please note that the characteristics in this chapter describe all 1 004 participants, whereas the results in chapter 6 are based on the 843 valid participants who remained after applying the exclusion criteria. Percentages and participant numbers can therefore differ slightly between the two chapters.

5.1 Role level and experience

The sample was senior and experienced. Top and middle management together made up **40%** of respondents, so a large share were decision-makers who consume reports rather than only produce them. Average experience in data analytics was **11 years** and rose steadily with seniority, from **10 years** for functional employees to **19 years** for top management. The effects of standardized notation were therefore measured mainly on professionals who read business reports as part of their daily work.

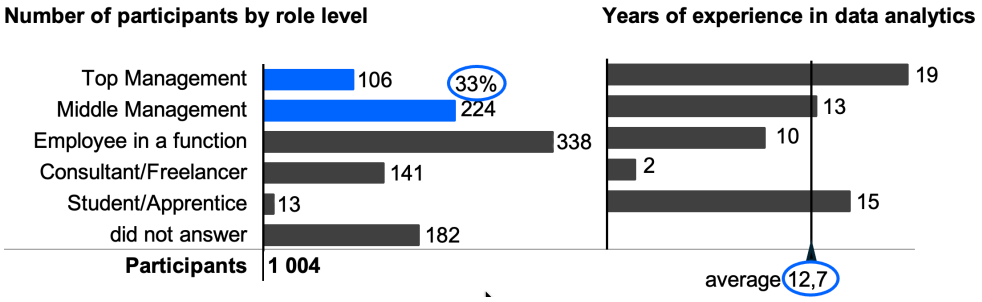

Figure 2: Role level and years of experience in data analytics (n= 1 004; 822 gave an answer)

5.2 Function

By function, the sample was weighted toward finance: Finance/Controlling was the largest function at **36%** of all participants, followed by IT/BI (**15%**) and Production (**11%**).

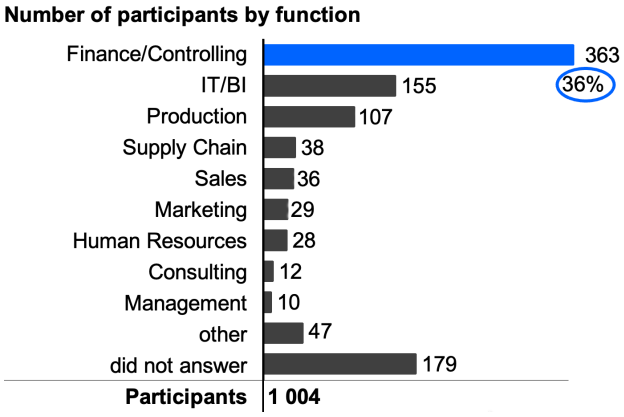

Figure 3: Function of participants (n= 1 004; 825 gave an answer)

5.3 Working location

Geographically the sample was centered on Europe (led by Germany, Italy, Poland, and Austria), but extended to the United States, Asia, and beyond. This spread suggests the benefits of standardized notation are not tied to a single reporting culture.



Figure 4: Working location of participants (n= 1 004; 822 gave an answer)

5.4 Familiarity with standardized reporting notation

Because the study compares ISO 24896-compliant reports with original, non-standardized ones, participants' prior exposure to the IBCS notation matters. Familiarity was limited: only **263 participants (26%)** had been trained or certified. Thus, the performance gains attributed to ISO 24896 were achieved with a sample for whom the notation was largely unfamiliar.

The two groups with prior exposure to the notation were additionally asked to rate their own command of it on a five-point scale, where 1 stands for no experience and 5 for expert. Across these 263 (26%) respondents, the

answers cluster in the middle of the scale. Measured against all 1 004 participants, only 107 (11%) claim an advanced command (level 4 and 5) of the notation.

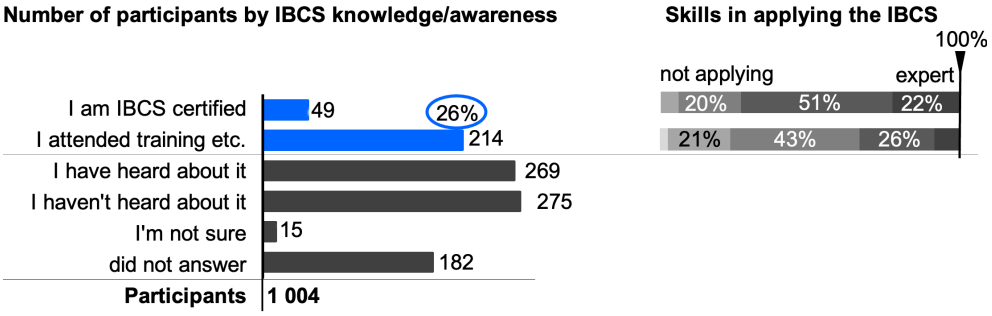

Figure 5: ISO 24896 familiarity through IBCS (n= 1 004; 822 gave an answer)

6 RESULTS: SPEED, ACCURACY, AND USER FRICTION

The study shows that standardized reporting notation improves report comprehension across different reporting domains and thereby strengthens the information basis for decision-making.

Using task completion time, error rates, and indicators of user engagement, the following analyses assess the effectiveness of ISO 24896 across multiple dimensions of report consumption.

6.1 Results by report type

The results for hypotheses H1 to H4 are first compared across different report types. The study included two distinct report types, Sales and Finance and Complaint Management, as well as the isolated Single Rules, which differ in both business context and reporting complexity. This comparison assesses whether the benefits of ISO 24896 are consistent across different reporting scenarios and levels of analytical challenge.

H1 Faster understanding of ISO 24896-compliant reports
The findings confirm that ISO 24896-based reports reduce task completion time significantly and substantially across all report types.

The effect is largest for **Sales and Finance** reports with a reduction in processing time of **47.8%** (the difference between the test group with the ISO 24896 layout and the control group is statistically highly significant at $p < 0.001$). Across the three reports included in the Sales and Finance stream, participants saved approximately five minutes in total.

Please note that the number of participants (n) shown in the charts varies between measures because of skipped answers, as each result includes only the valid data for its measure.

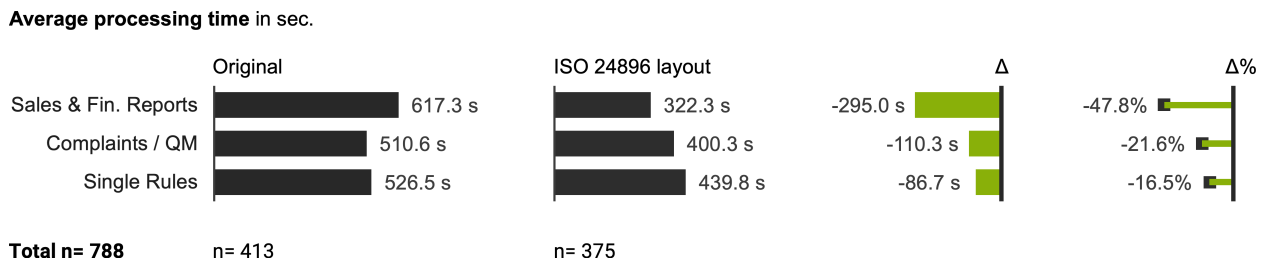

Figure 6: Average processing time

A smaller effect was observed for Complaint Management reports, with a time saving of 21.6% (highly significant, $p < 0.001$). This may reflect participants' limited familiarity with this type of data and reporting scenario. By contrast, the larger effect for Sales and Finance reports is likely attributable to their greater familiarity with this business domain.

The **Single Rules** reports show even smaller time savings of only **16.5%**, yet still highly significant ($p < 0.001$). This is likely related to the nature of the tasks: Each question tests only one rule in isolation on a simplified chart, while **Sales and Finance** and **Complaint Management** reports combine multiple ISO 24896 rules simultaneously. This suggests a synergistic effect: when all rules are applied together, the benefit is greater than the sum of the individual parts. Each rule reduces one source of cognitive friction, but when several rules work together on a complete report, the combined effect on reading speed and accuracy is compounded. Single Rules results should therefore not be read as a weaker confirmation of the hypothesis – they reflect a different measurement altogether.

	n		**Task completion time** in s			
	Original	ISO 24896	Original	ISO 24896	Δ	Δ%
Income statement	133	127	279.4	137.9	-141.6	-50.7%
Net sales by country	130	124	152.6	89.8	-62.8	-41.2%
Daily sales	127	126	185.3	94.6	-90.6	-48.9%
Sales and Finance			**617.3**	**322.3**	**-295.0**	**-47.8%**
Complaints	136	126	253.1	198.2	-54.8	-21.7%
Complaints drilldown	136	126	257.6	202.1	-55.5	-21.5%
Complaint Mgmt.			**510.6**	**400.3**	**-110.3**	**-21.6%**
Scaling	159	131	131.1	106.4	-24.7	-18.9%
Scenario types	156	132	104.1	94.0	-10.1	-9.7%
Variances	155	129	75.2	69.4	-5.9	-7.8%
Titles	153	129	91.2	78.8	-12.3	-13.5%
Time direction	151	125	74.9	55.6	-19.3	-25.8%
Integrated labels	150	127	50.0	35.6	-14.4	-28.8%
Single Rules			**526.5**	**439.8**	**-86.7**	**-16.5%**

Table 2: Average processing time of each report page

H2 Better understanding of ISO 24896-compliant reports

The findings also confirm that ISO 24896-compliant reports result in significantly fewer errors (i.e., higher answer accuracy) in the majority of tasks.

Sales and Finance reports show the largest error reduction, with **52.7%** fewer reading errors (highly significant at $p < 0.001$), and about 25% of the participants in the ISO 24896 stream made no errors at all.

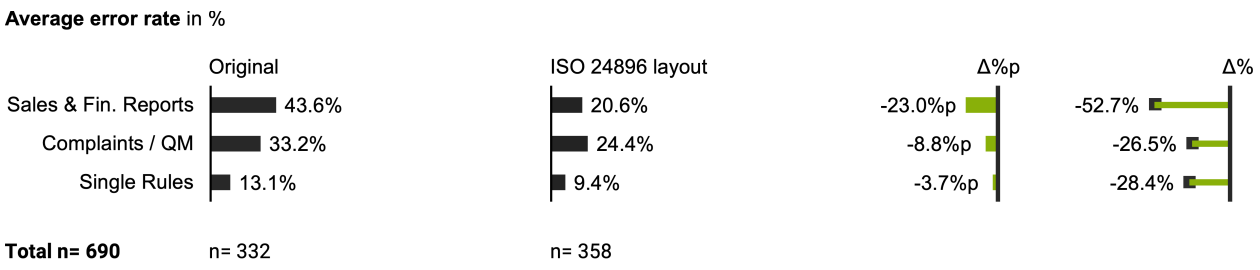

Figure 7: Average error rate

Despite the smaller time savings for **Complaint Management** reports, ISO 24896-compliant reports still resulted in a **26.5%** lower error rate (significant at $p = 0.035$). That this reduction is smaller than for Sales and Finance reports may reflect participants' limited familiarity with this type of report, suggesting that interpreting Complaint Management reports requires greater domain-specific knowledge than Sales and Finance reports.

Participants in the ISO-compliant stream made **28.4%** fewer errors (not statistically significant at $p = 0.097$) when working with **Single Rule**s reports. These reports are generally simpler than the Sales and Finance and Complaint Management reports. As discussed under hypothesis H1, their lower inherent complexity makes the tasks easier, reducing the potential benefit of ISO 24896. Consequently, the difference between the original, non-ISO-compliant and ISO-compliant versions was smaller than for the other report types.

H3 Transferability across report types
The advantage of ISO 24896 was observed across all report types included in the study.

The strongest effects were found for the **Sales and Finance** reports. However, this finding should be interpreted in light of the participant profile, as a large proportion of participants came from Finance and BI-related functions and were therefore likely to be familiar with this type of reporting.

The **Complaint Management** reports also showed a positive impact of ISO 24896, providing evidence that the benefits of standardized reporting notation can be transferred across different business domains. The smaller effects observed compared with the Sales and Finance reports may be explained by the fact that most participants were less familiar with Complaint Management reporting and the associated business context.

The **Single Rules** reports are more difficult to interpret in this regard. Since these tasks were based on the interpretation of individual charts rather than complete reports, they cannot be considered a distinct reporting domain. Consequently, the Single Rules results provide no evidence for assessing the transferability of ISO 24896 across domains.

H4 Reduced user friction
The findings partially confirm this hypothesis: participants working with ISO 24896-compliant reports show lower task abandonment rates overall, but the difference is statistically significant only for the Sales and Finance reports.

The analysis begins with participant dropout behavior, focusing on participants who discontinued the study without completing at least 50% of the assigned tasks. An initial analysis of the dropout rates suggests that participants in the ISO-compliant streams were more likely to complete the study than participants working with the original reports:

Dropout rates	Original	ISO 24896	*p*
Sales and Finance	22.6%	13.2%	0.032
Complaint Management	19.7%	16.5%	0.481
Single Rules	10.9%	12.8%	0.616
All report types	**17.7%**	**14.2%**	**0.143**

Table 3: Dropout rates by report type

Across all report types, the dropout rate is 17.7% for the original reports and 14.2% for the ISO-compliant versions, a difference that does not reach statistical significance ($p = 0.143$), and the results differ considerably by report type. The clearest effect appears in the Sales and Finance stream, with a dropout rate of 22.6% for the original reports compared with 13.2% for the ISO-compliant versions. It is also the only difference among the report types to reach statistical significance ($p = 0.032$). These reports come from the domain familiar to a large share of participants, and it is the same stream in which ISO 24896 produced its largest gains in speed and accuracy. The Complaint Management reports point in the same direction, with 19.7% compared with 16.5%, but the gap is smaller and not statistically significant, in line with participants' more limited familiarity with this reporting context. The Single Rules show the lowest dropout rates in both versions, with a slightly higher rate for the ISO-compliant charts (12.8% compared with 10.9%), a difference that is not statistically significant. Tasks that test one isolated rule on a simplified chart give participants little reason to give up, whichever version they see.

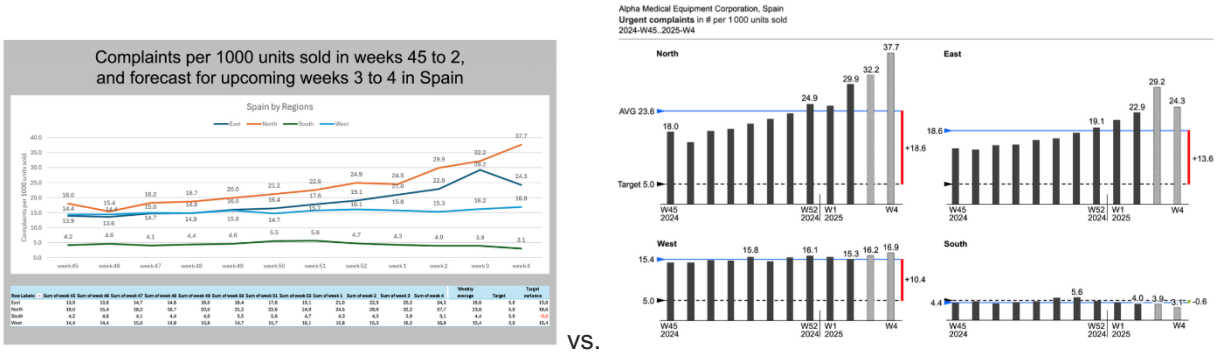

Figure 8: Original vs. ISO-compliant report for the complaints drilldown task

For Complaint Management, a closer look at individual questions reveals a pattern that the overall dropout rates do not capture. The most complex question in the Complaints Drilldown task (Figure 8) required participants to identify a specific week within a regional drill-down. Here the task-level skip rate, meaning the share of participants who left the question unanswered, was 20.3% (29 out of 143) in the original-report stream, compared with 9.1% (12 out of 132) in the ISO-compliant stream. Participants working with the original reports were therefore more than twice as likely to skip the most demanding question.

This finding suggests that when visual complexity exceeds a reader's processing capacity, the response may be disengagement rather than an incorrect answer. Poorly structured or visually cluttered reports may not only increase task completion times and error rates; they may also reduce users' willingness to continue working with the report. In other words, the benefits of ISO 24896 may extend beyond efficiency and accuracy to sustained user engagement when interpreting complex business information.

6.2 Differences between participant characteristics

The following analysis investigates whether the benefits of ISO 24896 differ across participant groups with varying functional domain expertise, organizational role levels, and IBCS familiarity.

With regard to report types, the analysis is largely limited to the functional reports in the Sales and Finance and Complaint Management domains. As expected, the Single Rules tasks reveal no consistent differences across levels of domain expertise.

Results by function

Business professionals from the departments of Sales, Marketing, Finance/Controlling, Human Resources, IT/BI, ESG, Procurement, Production, Project Management, Supply Chain, and Management participated in the study. Participants were allowed to indicate affiliation with multiple functions. The two largest groups were Finance/Controlling (363 or 36%) and IT/BI (155 or 15%). Since the participants are split across six groups (three report types × ISO-compliant versus original reports), the sample sizes of the remaining functions were too small to support statistically significant conclusions.

For the **Sales and Finance** reports, participants from the Finance/Controlling function achieved substantially greater improvements than participants from other functions, both in task completion time and error rate. Task completion time decreased by 53.9% (highly significant at $p < 0.001$), compared with 43.4% for IT/BI participants (significant at $p = 0.004$). The error rate decreased by 57.7% (highly significant at $p < 0.001$), compared with 50.3% for IT/BI participants (significant at $p = 0.010$). This result is particularly noteworthy because Finance/Controlling participants already started from a considerably lower error rate in the original reports (40.3%) than IT/BI participants (48.3%).

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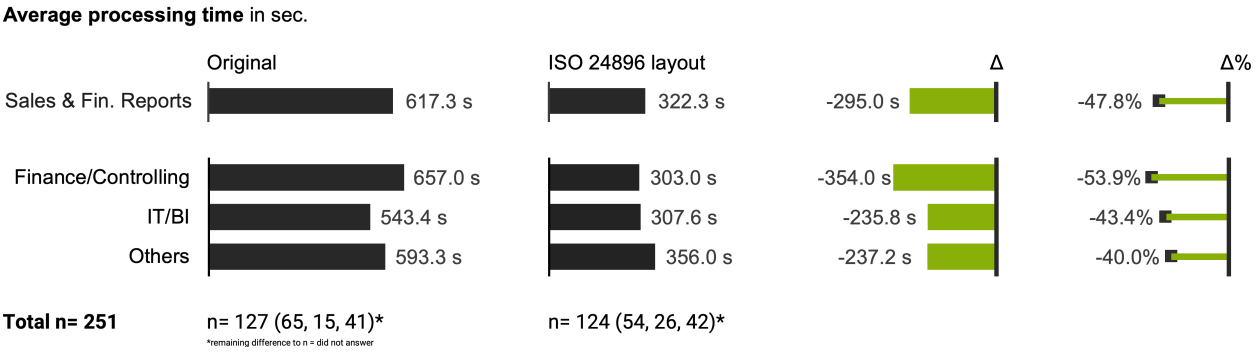


Figure 9: Average processing time for Sales and Finance reports by participant function

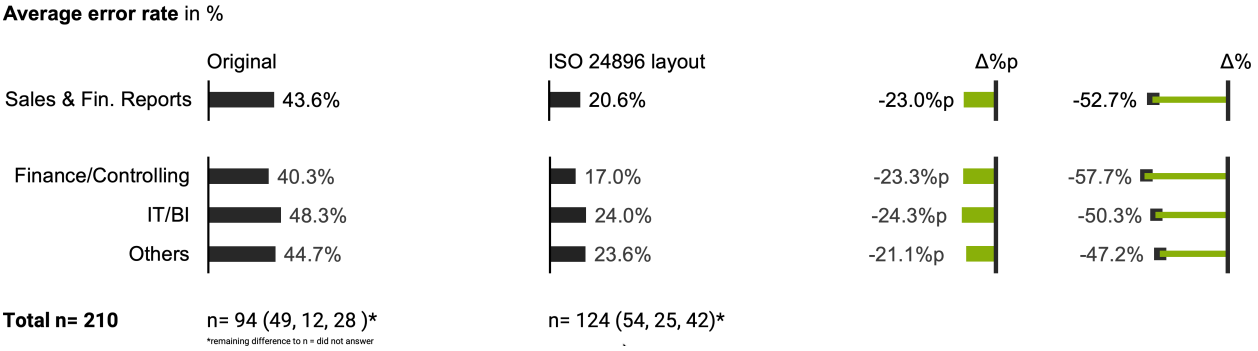


Figure 10: Average error rate for Sales and Finance reports by participant function

In the **Complaint Management** scenario, the IT/BI group stood out with a 39.9% reduction in error rate (not statistically significant at $p = 0.151$), whereas participants who indicated neither IT/BI nor Finance/Controlling improved by only 19.6% (not statistically significant at $p = 0.655$). The average improvement across all domains was 26.5%. This result may be attributed to the greater familiarity of IT/BI participants with Complaint Management, enabling them to take better advantage of the increased transparency provided by ISO 24896-compliant reports when making decisions.

For the **Single Rules** tasks, no significant differences were observed between functions with respect to task completion times, error rates, or the changes between original reports and ISO 24896-compliant remakes.

Overall, the analysis by function suggests that the more familiar a user group is with the content and context of a report, the greater the benefits gained from applying ISO 24896. In other words, ISO 24896 appears to amplify existing domain expertise by making relevant information easier to identify, interpret, and use for decision-making.

Results by role level

Participants who provided information about their role level belonged either to Top Management (11%), Middle Management (22%), or Employees in a Functional Department (34%). In addition, 15% of participants were classified as Consultants, Freelancers, or Students, who typically encounter business reporting from an external perspective. 18% of the participants did not answer the question about their management level. For the **Sales and Finance** reports, the benefits of ISO 24896-compliant reporting increased with management level. This trend was observed for both task completion time, with reductions ranging from 46.9% to 53.4%, and error rate, with reductions ranging from 34.2% to 69.9%.

As a result, the Top Management group achieved the best absolute performance when working with ISO 24896-compliant reports.

Faster Insights, Better Understanding (ISO 24896)

Task completion time decreased to 291 seconds for Top Management participants, compared with 332 seconds for Employees in a Functional Department. Thus, members of the Top Management achieved time savings of 53.4% (statistically significant at $p = 0.008$). Employees in a functional department still saved 46.9% of processing time (significant *at* $p < 0.005$) when they worked with the ISO 24896 layout. Participants attributed to the Middle Management saved 52.9% processing time as well (significant *at* $p < 0.005$).

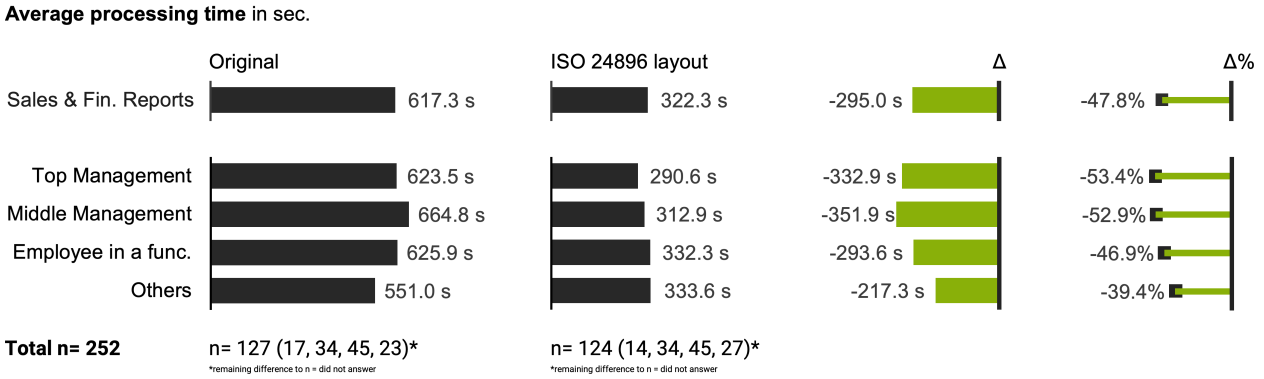


Figure 11: Average processing time for Sales and Finance reports by role level

Error rate for Top Management participants decreased to 12.8%, with them making 69.9% fewer errors compared to the control group (statistically significant at $p = 0.008$). In comparison with employees in a functional department, who had a 25.3% error rate and who 'only' performed 34.2% better compared to the control group (not statistically significant at $p = 0.211$), Top Management participants achieved the best result of all role levels. This finding is particularly noteworthy because employees in a functional department performed slightly better on the original reports, achieving an error rate of 38.5% compared with 42.4% for Top Management participants. The ISO 24896-compliant reports not only eliminated this initial disadvantage but reversed it substantially. The error reduction of the Middle Management participants with 60.1% fewer errors is statistically significant ($p < 0.005$).

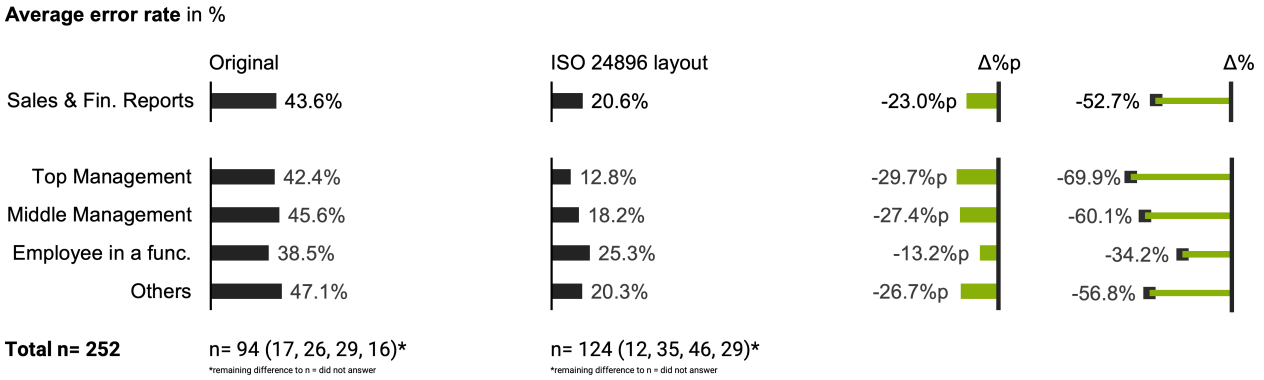


Figure 12: Average error rate for Sales and Finance reports by role level

The results for the **Complaint Management** reports paint a very different picture. In contrast to their more operational colleagues, Top Management participants benefited only marginally from the application of ISO 24896 in terms of task completion time. Their completion times improved by just 5.3% (not significant at $p = 0.606$) whereas participants from Middle Management and functional departments completed the tasks 30.5% (significant at $p < 0.005$) and 25.9% (significant at $p < 0.005$) faster. Consultants, Freelancers, and Students also achieved a substantial improvement of 20.4%.

A similar pattern can be observed for error rates. While the error rate of Top Management participants remained virtually unchanged (27.7% for ISO 24896, 27.6% for the original layout – not significant at $p = 0.465$), the other groups reduced their error rates by between 25.3% (for employees - not significant at $p = 0.281$) and 38.2% (for the Middle Management - significant at $p < 0.05$) when working with the ISO layout. One possible explanation is that Top Management participants focused primarily on understanding the complex management scenario itself, while the effort required to decode the report notation played a less significant role. This interpretation is supported by the fact that Top Management participants already achieved by far the lowest error rate when working with the original, non-ISO-compliant reports, at 27.6%. Consequently, there was less room for improvement through the increased transparency provided by ISO 24896.

Results by ISO 24896 familiarity through IBCS

The results are now examined in relation to participants' familiarity with the IBCS-based reporting notation standardized in ISO 24896. The participants providing information about their IBCS familiarity were classified into four groups: those who are IBCS-certified (5%), those who had previously studied IBCS (21%), those who had heard of IBCS (27%), and those for whom the topic was entirely new or are not sure (29%). 18% of the participants did not answer this question.

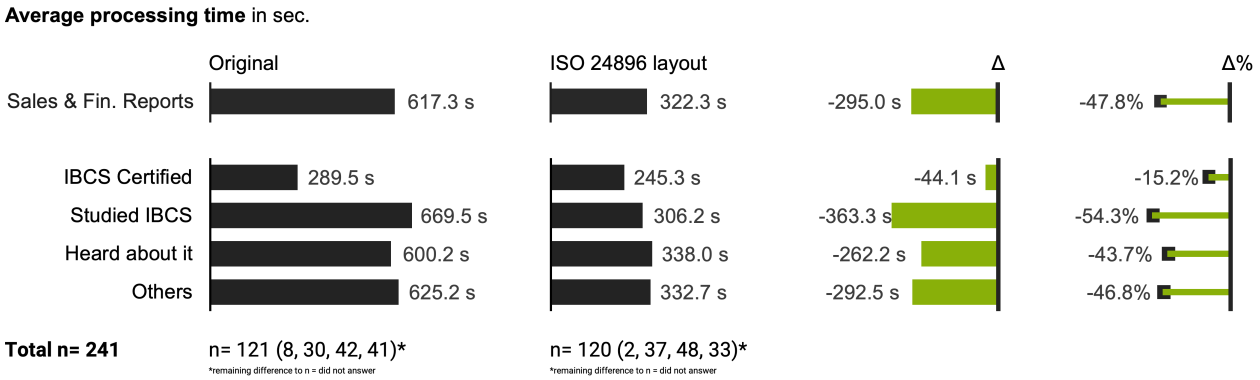


Figure 13: Average processing time for Sales and Finance reports by familiarity with IBCS

A finding regarding the **IBCS-certified** participants stands out: First, it is unsurprising that IBCS-certified participants achieved the shortest task completion times when working with the ISO-compliant Sales and Finance reports. They achieved a completion time of 245 seconds (not significant at $p = 0.389$) compared with 306 seconds (significant at $p < 0.005$) for those who studied IBCS before and 338 seconds (significant at $p < 0.005$) for those who heard about it. More surprising, however, is that they also completed the non-compliant original reports more than twice as fast as the other participants with 290 seconds compared with 600 to 670 seconds. We attribute this result to the fact that IBCS-certified participants have typically spent considerably more time studying report design and business communication. As a consequence, they appear to be better equipped to interpret not only ISO-compliant reports but also non-standardized report designs.

This finding should, however, be interpreted with caution. The 48 IBCS-certified participants were distributed across six experimental groups (three report types × ISO-compliant versus original reports), resulting in fewer than ten IBCS-certified participants per group on average. Consequently, the statistical robustness of the findings for this subgroup is limited.

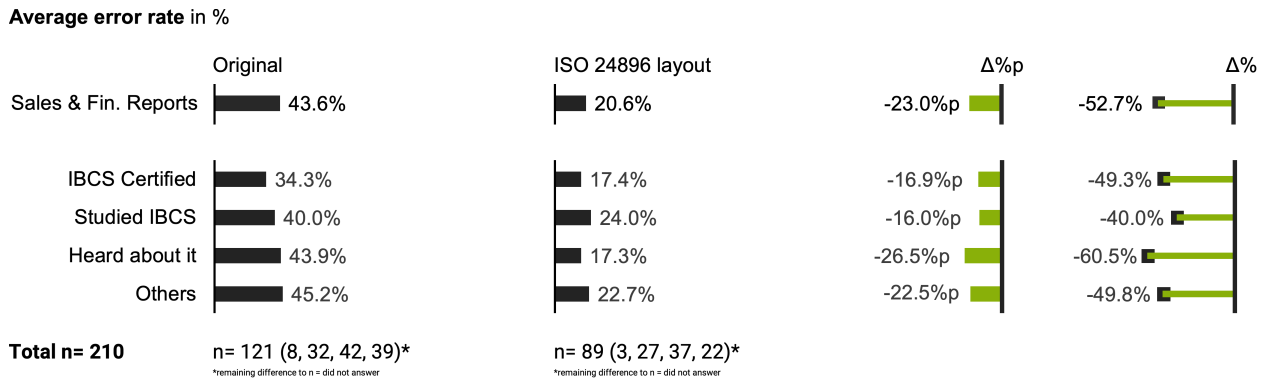


Figure 14: Average error rate for Sales and Finance reports by familiarity with IBCS

Another interesting observation concerns the number of skipped questions. For the Sales and Finance reports, the **skip rate** was substantially lower among participants with prior IBCS experience than among those with little or no familiarity with IBCS. For example, none of the IBCS-certified participants skipped a single question, whereas participants with no prior IBCS experience left 2.3% of the questions unanswered in the ISO-compliant stream and as many as 12.0% in the original, non-standardized stream.

For the Complaint Management and Single Rules tasks, overall skip rates were also higher for the original reports - 2.0 times higher and 1.4 times higher, respectively, than for the ISO-compliant reports. However, in these report types, prior IBCS experience did not appear to have a consistent effect on the likelihood of skipping questions.

These findings suggest that participants are particularly unlikely to skip questions when working with ISO-compliant reports if they are already familiar with the notation and operate within a domain they know well, such as Sales and Finance. In such situations, the reports still contain sufficient complexity to make the notation valuable, while the participants' familiarity with both the subject matter and the reporting conventions enables them to interpret the reports with confidence. By contrast, when tasks are either very simple, as in the Single Rules exercises, or comparatively unfamiliar and complex, as in the Complaint Management scenario, the additional benefit of prior IBCS experience appears to be less pronounced.

6.3 Limitations

The results should be interpreted in light of several limitations. First, the study was conducted in a **controlled online environment** rather than in a real business decision-making context. Although the reporting tasks were designed to reflect realistic business scenarios, they cannot fully capture the complexity of organizational decision processes.

Second, the study measures report comprehension, interpretation accuracy, and task completion time, but it does not directly assess the **long-term impact** of standardized reporting notation on business decisions or organizational performance.

Third, the evaluated reports represent selected reporting scenarios from Sales and Finance, Complaint Management, and isolated visualization rules. While these scenarios cover common reporting situations, they do not represent the full diversity of **business reporting contexts**.

Finally, although the analyses examined the influence of participant characteristics and prior knowledge, the composition of the participant sample and the distribution of reporting maturity levels may still limit the **generalizability** of the findings. Future research could extend these findings by validating the observed effects in additional reporting domains, organizational settings, and user populations.

7 IMPLICATIONS FOR BUSINESS REPORTING AND DECISION-MAKING

The findings of this study shift the discussion about reporting standards from visual preference to **measurable performance**. ISO 24896-compliant reports reduced task completion time across all tested report types, while important reporting scenarios also showed substantial improvements in answer accuracy. Standardized notation should therefore be viewed not primarily as a design choice, but as a factor that can influence how efficiently business information is understood.

This gives reporting standardization a clear **productivity** dimension. When recurring business concepts such as actuals, plans, forecasts, variances, and time periods are represented consistently, users can spend less effort decoding the report format and more attention interpreting the underlying business information. A shared notation can also simplify onboarding by giving users a consistent visual language to learn rather than different conventions for each report or tool. The study therefore indicates that standardized business reporting notation can turn visual consistency into measurable performance gains.

A common visual language can also support **more reliable interpretation**. Consistent representation helps users orient themselves more quickly, identify relevant information faster, and reduce ambiguity caused by changing visual conventions. The study did not directly measure cognitive load, so these mechanisms should be understood as a practical interpretation of the observed performance improvements rather than as independently tested effects.

A further indication relates to **reduced user friction**. In selected reporting situations, participants working with ISO 24896-compliant reports were less likely to skip or abandon demanding tasks, suggesting that clearer visual structure may help users stay engaged when interpreting complex business information.

These findings are particularly relevant to **decision-making**. The study did not measure the quality of real-life management decisions directly, but it did measure the information-processing stage that precedes them: identifying relevant facts, understanding variances and trends, interpreting performance, and answering business-related questions correctly. More efficient and reliable comprehension can therefore provide a stronger basis for management discussions and decisions.

The implications become even more important at **organizational scale**. Large organizations often operate extensive reporting landscapes across functions, countries, business units, and technology platforms. In such environments, inconsistent visual conventions can create repeated interpretation effort. A shared notation can reduce this friction by providing a common reporting language across organizational boundaries.

This makes ISO 24896 relevant not only for report design, but also for **reporting governance**. Its principles can be translated into reporting guidelines, BI templates, dashboard design standards, reusable components, onboarding, and training. In this way, consistency can be embedded into the reporting environment rather than depend on individual design choices.

The study also shows that the magnitude of the benefit varies by **reporting context**. Effects differed by report type, domain familiarity, management role, prior exposure to the notation, and task complexity. The findings therefore support standardization as a general direction, while also indicating that its impact depends on how and where it is applied.

The results additionally point to a particularly relevant implication for **senior management**. In the Sales and Finance reports, Top Management participants achieved some of the strongest improvements in both processing time and answer accuracy, when working with ISO 24896-compliant reports. This suggests that a consistent visual semantics may be especially valuable for experienced decision-makers who already understand the business context and benefit from faster access to the meaning of the information.

Taken together, the evidence suggests that standardized visual notation can improve the **efficiency and reliability** of business information processing. For organizations, the broader implication is a shift from isolated report design toward a more systematic approach to business communication based on shared visual rules.

8 CONCLUSION

This study provides empirical evidence from a controlled, task-based research design that business reports prepared in accordance with ISO 24896 can be understood faster and, in important reporting tasks, more accurately than corresponding original reports.

Across all report types tested, participants completed interpretation tasks faster with ISO 24896-compliant reports. The results also show that a common visual language can support the understanding of business information across different reporting contexts.

The study does not directly measure long-term business performance or the quality of real-life management decisions. It does, however, show that the information supporting such decisions can be interpreted more efficiently and reliably.

More broadly, such standardization may contribute to a more transparent and consistent management information culture, strengthening the basis for decision-making, governance, and organizational oversight.

9 RECOMMENDATIONS FOR ORGANIZATIONS

Organizations should use ISO 24896 as a common visual language for business reporting and treat its implementation as an organizational capability rather than a one-time redesign initiative. Sustainable benefits are more likely when the notation is embedded in reporting guidelines, templates, dashboard design, and training, helping users interpret business information more efficiently and reliably as a basis for management decisions.

The following recommendations outline how organizations can translate this notation into everyday reporting practice.

Define a common reporting notation
Establish reporting guidelines based on ISO 24896 and, where appropriate, the broader IBCS framework. Define how recurring business concepts such as actuals, plans, forecasts, variances, scenarios, scaling, labels, and highlighting should be represented across reports and dashboards.

The objective is not to make every report look identical, but to ensure that the same visual elements carry the same meaning wherever they are used.

Audit the existing reporting landscape
Systematically review management reports, dashboards, recurring presentations, and BI applications.

Identify inconsistent notation, unnecessary complexity, ambiguous representations, and reports that require users to repeatedly relearn how information is presented. Prioritize reports that are frequently used for management discussions, performance reviews, and decision-making.

Embed standards in BI tools and templates
Integrate ISO 24896 principles into BI templates, dashboard libraries, design systems, standard report structures, and reusable visualization components.

This makes standardization scalable and reduces dependence on individual report creators applying the rules manually. The preferred reporting convention should become the default way of creating business information.

Faster Insights, Better Understanding (ISO 24896)

Train report creators and users
Provide practical training for those who create reports and concise onboarding for those who use them.

Report creators need to understand how to apply the notation correctly and consistently. Report users need to understand the recurring visual conventions well enough to interpret information efficiently.

The study itself included a short introduction to the notation before participants worked with ISO 24896-compliant reports, illustrating that even limited onboarding can be part of effective implementation.

Measure reporting performance
Evaluate reporting quality through user performance, not visual preference alone.

Measures can include task completion time, answer accuracy, skipped questions, interpretation errors, and structured user testing. Comparing existing reports with redesigned versions can help determine where standardization produces the greatest practical benefit.

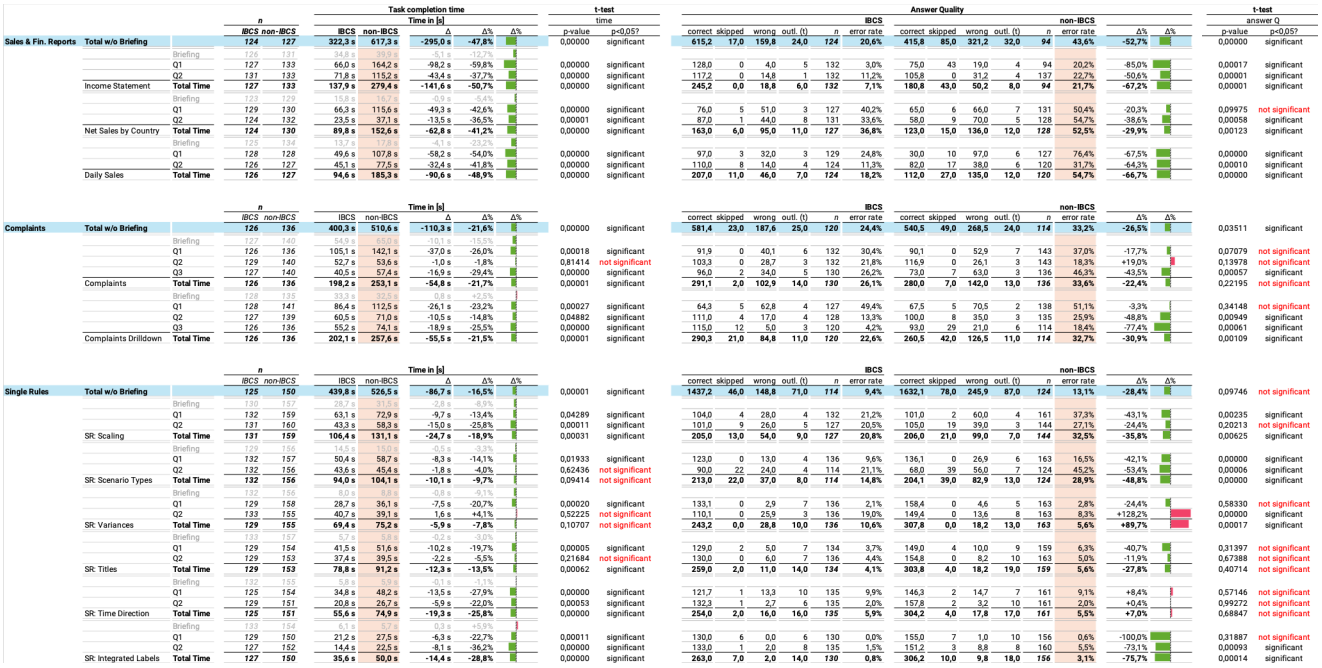
Establish reporting governance
Treat reporting consistency as a governance responsibility rather than an individual design choice.

Finance, Controlling, BI, IT, and other functions responsible for management information can jointly define standards, maintain templates, support training, and review implementation.

The aim is not complete centralization, but a stable visual language that remains consistent across reports, tools, functions, and organizational units.

APPENDICES

Results of the Complete Sample



			n		Task completion time Time in [s]				t-test time		Answer Quality IBCS						non-IBCS						t-test answer Q	
			IBCS	non-IBCS	IBCS	non-IBCS	Δ	Δ%	p-value	p<0,05?	correct	skipped	wrong	outl. (t)	n	error rate	correct	skipped	wrong	outl. (t)	n	error rate	Δ%	Δ%	p-value	p<0,05?
Sales & Fin. Reports	**Total w/o Briefing**		**124**	**127**	**322,3 s**	**617,3 s**	**-295,0 s**	**-47,8%**	0,00000	significant	**615,2**	**17,0**	**159,8**	**24,0**	**124**	**20,6%**	**415,8**	**85,0**	**321,2**	**32,0**	**94**	**43,6%**	**-52,7%**		0,00000	significant
	Briefing		126	131	94,8 s	108,2 s	-13,3 s	-12,3%																		
	Q1		127	133	66,0 s	164,2 s	-98,2 s	-59,8%	0,00000	significant	128,0	0	4,0	5	132	3,0%	75,0	43	19,0	4	94	20,2%	-85,0%		0,00017	significant
	Q2		131	133	71,8 s	115,2 s	-43,4 s	-37,7%	0,00000	significant	117,2	0	14,8	1	132	11,2%	105,8	0	31,2	4	137	22,7%	-50,6%		0,00001	significant
	Income Statement	**Total Time**	**127**	**133**	**137,9 s**	**279,4 s**	**-141,6 s**	**-50,7%**	0,00000	significant	**245,2**	**0,0**	**18,8**	**6,0**	**132**	**7,1%**	**180,8**	**43,0**	**50,2**	**8,0**	**94**	**21,7%**	**-67,2%**		0,00001	significant
		Briefing	123	129	15,8 s	16,7 s	-0,9 s	-5,4%																		
		Q1	129	130	66,3 s	115,6 s	-49,3 s	-42,6%	0,00000	significant	76,0	5	51,0	3	127	40,2%	65,0	6	66,0	7	131	50,4%	-20,3%		0,09975	not significant
		Q2	124	132	23,5 s	37,1 s	-13,5 s	-36,5%	0,00001	significant	87,0	1	44,0	8	131	33,6%	58,0	9	70,0	5	128	54,7%	-38,6%		0,00058	significant
	Net Sales by Country	**Total Time**	**124**	**130**	**89,8 s**	**152,6 s**	**-62,8 s**	**-41,2%**	0,00000	significant	**163,0**	**6,0**	**95,0**	**11,0**	**127**	**36,8%**	**123,0**	**15,0**	**136,0**	**12,0**	**128**	**52,5%**	**-29,9%**		0,00123	significant
		Briefing	125	134	13,7 s	17,8 s	-4,1 s	-23,2%																		
		Q1	128	128	49,6 s	107,8 s	-58,2 s	-54,0%	0,00000	significant	97,0	3	32,0	3	129	24,8%	30,0	10	97,0	6	127	76,4%	-67,5%		0,00000	significant
		Q2	126	127	45,1 s	77,5 s	-32,4 s	-41,8%	0,00000	significant	110,0	8	14,0	4	124	11,3%	82,0	17	38,0	6	120	31,7%	-64,3%		0,00010	significant
	Daily Sales	**Total Time**	**126**	**127**	**94,6 s**	**185,3 s**	**-90,6 s**	**-48,9%**	0,00000	significant	**207,0**	**11,0**	**46,0**	**7,0**	**124**	**18,2%**	**112,0**	**27,0**	**135,0**	**12,0**	**120**	**54,7%**	**-66,7%**		0,00000	significant

			n		Time in [s]						IBCS						non-IBCS									
			IBCS	non-IBCS	IBCS	non-IBCS	Δ	Δ%	Δ%		correct	skipped	wrong	outl. (t)	n	error rate	correct	skipped	wrong	outl. (t)	n	error rate	Δ%	Δ%		
Complaints	**Total w/o Briefing**		**126**	**136**	**400,3 s**	**510,6 s**	**-110,3 s**	**-21,6%**	0,00000	significant	**581,4**	**23,0**	**187,6**	**25,0**	**120**	**24,4%**	**540,5**	**49,0**	**268,5**	**24,0**	**114**	**33,2%**	**-26,5%**		0,03511	significant
		Briefing	127	140	54,9 s	65,0 s	-10,1 s	-15,5%																		
		Q1	126	136	105,1 s	142,1 s	-37,0 s	-26,0%	0,00018	significant	91,9	0	40,1	6	132	30,4%	90,1	0	52,9	7	143	37,0%	-17,7%		0,07079	not significant
		Q2	129	140	52,7 s	53,6 s	-1,0 s	-1,8%	0,81414	not significant	103,3	0	28,7	3	132	21,8%	116,9	0	26,1	3	143	18,3%	+19,0%		0,13978	not significant
		Q3	127	140	40,5 s	57,4 s	-16,9 s	-29,4%	0,00000	significant	96,0	2	34,0	5	130	26,2%	73,0	7	63,0	3	136	46,3%	-43,5%		0,00057	significant
	Complaints	**Total Time**	**126**	**136**	**198,2 s**	**253,1 s**	**-54,8 s**	**-21,7%**	0,00001	significant	**291,1**	**2,0**	**102,9**	**14,0**	**130**	**26,1%**	**280,0**	**7,0**	**142,0**	**13,0**	**136**	**33,6%**	**-22,4%**		0,22195	not significant
		Briefing	128	135	33,3 s	32,5 s	0,8 s	+2,5%																		
		Q1	128	141	86,4 s	112,5 s	-26,1 s	-23,2%	0,00027	significant	64,3	5	62,8	4	127	49,4%	67,5	5	70,5	2	138	51,1%	-3,3%		0,34148	not significant
		Q2	127	139	60,5 s	71,0 s	-10,5 s	-14,8%	0,04882	significant	111,0	4	17,0	4	128	13,3%	100,0	8	35,0	3	135	25,9%	-48,8%		0,00949	significant
		Q3	126	136	55,2 s	74,1 s	-18,9 s	-25,5%	0,00000	significant	115,0	12	5,0	3	120	4,2%	93,0	29	21,0	6	114	18,4%	-77,4%		0,00061	significant
	Complaints Drilldown	**Total Time**	**126**	**136**	**202,1 s**	**257,6 s**	**-55,5 s**	**-21,5%**	0,00001	significant	**290,3**	**21,0**	**84,8**	**11,0**	**120**	**22,6%**	**260,5**	**42,0**	**126,5**	**11,0**	**114**	**32,7%**	**-30,9%**		0,00109	significant

			n		Time in [s]						IBCS						non-IBCS									
			IBCS	non-IBCS	IBCS	non-IBCS	Δ	Δ%	Δ%		correct	skipped	wrong	outl. (t)	n	error rate	correct	skipped	wrong	outl. (t)	n	error rate	Δ%	Δ%		
Single Rules	**Total w/o Briefing**		**125**	**150**	**439,8 s**	**526,5 s**	**-86,7 s**	**-16,5%**	0,00001	significant	**1437,2**	**46,0**	**148,8**	**71,0**	**114**	**9,4%**	**1632,1**	**78,0**	**245,9**	**87,0**	**124**	**13,1%**	**-28,4%**		0,09746	not significant
		Briefing	132	157	63,1 s	71,9 s	-8,8 s	-12,3%																		
		Q1	132	159	63,1 s	72,9 s	-9,7 s	-13,4%	0,04289	significant	104,0	4	28,0	4	132	21,2%	101,0	2	60,0	4	161	37,3%	-43,1%		0,00235	significant
		Q2	131	160	43,3 s	58,3 s	-15,0 s	-25,8%	0,00011	significant	101,0	9	26,0	5	127	20,5%	105,0	19	39,0	3	144	27,1%	-24,4%		0,20213	not significant
	SR: Scaling	**Total Time**	**131**	**159**	**106,4 s**	**131,1 s**	**-24,7 s**	**-18,9%**	0,00031	significant	**205,0**	**13,0**	**54,0**	**9,0**	**127**	**20,8%**	**206,0**	**21,0**	**99,0**	**7,0**	**144**	**32,5%**	**-35,8%**		0,00625	significant
		Briefing	129	156	14,6 s	15,0 s	-0,5 s	-3,3%																		
		Q1	132	157	50,4 s	58,7 s	-8,3 s	-14,1%	0,01933	significant	123,0	0	13,0	4	136	9,6%	136,1	0	26,9	6	163	16,5%	-42,1%		0,00000	significant
		Q2	132	156	43,6 s	45,4 s	-1,8 s	-4,0%	0,62436	not significant	90,0	22	24,0	4	114	21,1%	68,0	39	56,0	7	124	45,2%	-53,4%		0,00006	significant
	SR: Scenario Types	**Total Time**	**132**	**156**	**94,0 s**	**104,1 s**	**-10,1 s**	**-9,7%**	0,09414	not significant	**213,0**	**22,0**	**37,0**	**8,0**	**114**	**14,8%**	**204,1**	**39,0**	**82,9**	**13,0**	**124**	**28,9%**	**-48,8%**		0,00000	significant
		Briefing	132	156	8,0 s	8,8 s	-0,8 s	-9,1%																		
		Q1	129	158	28,7 s	36,1 s	-7,5 s	-20,7%	0,00020	significant	133,1	0	2,9	7	136	2,1%	158,4	0	4,6	5	163	2,8%	-24,4%		0,58330	not significant
		Q2	133	155	40,7 s	39,1 s	1,6 s	+4,1%	0,52225	not significant	110,1	0	25,9	3	136	19,0%	149,4	0	13,6	8	163	8,3%	+128,2%		0,00000	significant
	SR: Variances	**Total Time**	**129**	**155**	**69,4 s**	**75,2 s**	**-5,9 s**	**-7,8%**	0,10707	not significant	**243,2**	**0,0**	**28,8**	**10,0**	**136**	**10,6%**	**307,8**	**0,0**	**18,2**	**13,0**	**163**	**5,6%**	**+89,7%**		0,00017	significant
		Briefing	133	157	5,7 s	5,8 s	-0,2 s	-3,9%																		
		Q1	129	154	41,5 s	51,6 s	-10,2 s	-19,7%	0,00005	significant	129,0	2	5,0	7	134	3,7%	149,0	4	10,0	9	159	6,3%	-40,7%		0,31397	not significant
		Q2	129	153	37,4 s	39,5 s	-2,2 s	-5,5%	0,21684	not significant	130,0	0	6,0	7	136	4,4%	154,8	0	8,2	10	163	5,0%	-11,9%		0,67388	not significant
	SR: Titles	**Total Time**	**129**	**153**	**78,8 s**	**91,2 s**	**-12,3 s**	**-13,5%**	0,00062	significant	**259,0**	**2,0**	**11,0**	**14,0**	**134**	**4,1%**	**303,8**	**4,0**	**18,2**	**19,0**	**159**	**5,6%**	**-27,8%**		0,40714	not significant
		Briefing	129	152	6,6 s	6,7 s	-0,1 s	-1,1%																		
		Q1	125	154	34,8 s	48,2 s	-13,5 s	-27,9%	0,00000	significant	121,7	1	13,3	10	135	9,9%	146,3	2	14,7	7	161	9,1%	+8,4%		0,57146	not significant
		Q2	129	151	20,8 s	26,7 s	-5,9 s	-22,0%	0,00053	significant	132,3	1	2,7	6	135	2,0%	157,8	2	3,2	10	161	2,0%	+0,4%		0,99272	not significant
	SR: Time Direction	**Total Time**	**125**	**151**	**55,6 s**	**74,9 s**	**-19,3 s**	**-25,8%**	0,00000	significant	**254,0**	**2,0**	**16,0**	**16,0**	**135**	**5,9%**	**304,2**	**4,0**	**17,8**	**17,0**	**161**	**5,5%**	**+7,0%**		0,68847	not significant
		Briefing	129	156	21,2 s	27,8 s	-6,3 s	-22,7%																		
		Q1	129	150	21,2 s	27,5 s	-6,3 s	-22,7%	0,00011	significant	130,0	6	0,0	6	130	0,0%	155,0	7	1,0	10	156	0,6%	-100,0%		0,31887	not significant
		Q2	127	152	14,4 s	22,5 s	-8,1 s	-36,2%	0,00000	significant	133,0	1	2,0	8	135	1,5%	151,2	3	8,8	8	160	5,5%	-73,1%		0,00093	significant
	SR: Integrated Labels	**Total Time**	**127**	**150**	**35,6 s**	**50,0 s**	**-14,4 s**	**-28,8%**	0,00000	significant	**263,0**	**7,0**	**2,0**	**14,0**	**130**	**0,8%**	**306,2**	**10,0**	**9,8**	**18,0**	**156**	**3,1%**	**-75,7%**		0,00014	significant

Full export of the study

If you would like to see all briefings, tasks and the answering options, please download a PDF export of the full study here: https://www.ibcs.com/wp-content/uploads/2026/10/LimeSurvey-Reporting-Survey.pdf

Study results

If you would like to see all results of the sample, please download an Excel export of the study here: https://www.ibcs.com/wp-content/uploads/2026/10/IBCS-Study_Results.xlsx

Raw study results (dataset)

If you would like to receive all raw results of the sample, please download an Excel export of the study here: https://www.ibcs.com/wp-content/uploads/2026/10/IBCS-Study_Raw-data_plain.xlsx

TABLE OF FIGURES

Figure 1: How we measured reporting performance 6
Figure 2: Role level and years of experience in data analytics (n= 1 004; 822 gave an answer)..... 10
Figure 3: Function of participants (n= 1 004; 825 gave an answer) 11
Figure 4: Working location of participants (n= 1 004; 822 gave an answer)..... 11
Figure 5: ISO 24896 familiarity through IBCS (n= 1 004; 822 gave an answer)..... 12
Figure 6: Average processing time..... 12
Figure 7: Average error rate 13
Figure 8: Original vs. ISO-compliant report for the complaints drilldown task 15
Figure 9: Average processing time for Sales and Finance reports by participant function..... 16
Figure 10: Average error rate for Sales and Finance reports by participant function 16
Figure 11: Average processing time for Sales and Finance reports by role level 17
Figure 12: Average error rate for Sales and Finance reports by role level..... 17
Figure 13: Average processing time for Sales and Finance reports by familiarity with IBCS..... 18
Figure 14: Average error rate for Sales and Finance reports by familiarity with IBCS 19

TABLE OF TABLES

Table 1: Average times and plausibility limits, Income Statement question 1 8
Table 2: Average processing time of each report page..... 13
Table 3: Dropout rates by report type..... 14

LICENSE AND STUDY INFORMATION

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