BRIDGING THE MEASUREMENT GAP

A Case for the Severity-Based Sliding Scale

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INDUSTRIES WORLDWIDE have long made efforts to codify and measure safety performance. In 1970, the Occupational Safety and Health Act (OSH Act) introduced guidelines for hazard assessment and recordable incident tracking. The total recordable incident rate (TRIR) has become the predominant metric used to compare safety performance across companies and projects. TRIR calculates the number of OSHA-recordable incidents per 200,000 work hours, making it a convenient standard for benchmarking. Yet, TRIR's underlying methodology—treating all incidents equally, regardless of their actual severity—has come under scrutiny.

Alternatives to TRIR

The severity-based sliding scale (SBSS) and the severity-based lagging indicator (SBLI) are two alternatives to TRIR that take incident severity into account.

Severity-Based Sliding Scale

SBSS is a severity-weighted evolution of the traditional TRIR framework. Rather than treating all recordable incidents equally, SBSS assigns fixed numerical weights to objectively defined injury outcomes—1.00 for a fatality, 0.95 for permanent disability, 0.85 for a lost-time injury, and proportionally lower weights for modified work or first aid cases. Because SBSS retains the familiar TRIR normalization formula (weighted score • 200,000 / hours worked), it integrates seamlessly into existing reporting systems while overcoming TRIR's core limitation: the inability to distinguish between high-consequence and low-consequence events.

KEY TAKEAWAYS

- **Total recordable incident rate (TRIR) counts OSHA-recordable injuries per 200,000 hours, making it a convenient standard for benchmarking. TRIR has become the predominant metric for comparing safety performance across companies and projects. However, it has come under scrutiny for treating all incidents equally, regardless of severity.**
- **The severity-based sliding scale (SBSS) index is a severity-weighted evolution of the traditional TRIR framework. This severity index applies fixed, transparent outcome weights to incidents and normalizes the weighted sum per 200,000 hours to preserve comparability with TRIR.**
- **The severity-based lagging indicator (SBLI) represents a broader category of severity-weighted metrics. SBLIs offer deeper analytic flexibility, but they are more subjective, harder to audit, and difficult to standardize across projects, companies or industries.**
- **While a blended approach using the SBLI and the SBSS offers a more accurate and forward-thinking alternative to the outdated TRIR metric, using the SBSS alone is the more practical and immediately implementable solution because of its simplicity, scalability and greater likelihood of acceptance among industry stakeholders.**
- **This article explores TRIR's limitations and presents SBSS as a practical bridge metric. SBSS preserves the familiar TRIR structure while adding fixed, auditable severity weights. Using both metrics avoids conflating frequency with severity and supports better decisions.**

Severity-Based Lagging Indicators

SBLIs represent a broader category of severity-weighted metrics. These tools may rely on internal consequence scoring systems, custom risk matrixes, exposure modifiers or proprietary weighting formulas that differ between organizations. While potentially offering deeper analytic flexibility, SBLIs are more subjective, harder to audit and difficult to standardize across projects, companies or industries.

Key Differences

Although both models aim to address TRIR's one-dimensional treatment of incidents, their practical characteristics differ substantially:

- **Standardization.** SBSS uses fixed, objective weights tied to recognized injury classifications; SBLIs use variable, organization-specific scoring.
- **Auditability.** SBSS aligns with OSHA and U.S. Bureau of Labor Statistics (BLS) injury categories, improving transparency; SBLI methods often require additional explanation or justification.
- **Comparability.** SBSS supports consistent cross-company benchmarking; SBLI systems do not.
- **Complexity.** SBSS preserves the simplicity of TRIR; SBLIs may require training, calibration or internal consensus building.
- **Regulatory compatibility.** SBSS represents an evolutionary enhancement, while SBLIs require rethinking how injuries are classified and measured.

Emphasizing Severity-Based Sliding Scale

While a blended approach incorporating SBLIs and SBSS could theoretically provide the most detailed picture of safety performance, using SBSS alone may be the most practical and immediately implementable solution. Its alignment with the existing TRIR structure lowers resistance to adoption, minimizes subjectivity and reduces the risk of "gaming" through reclassification. SBSS strengthens the accuracy and credibility of safety measurement without requiring organizations to overhaul their reporting architecture or retrain their workforce. In contrast, SBLI systems, while valuable for internal analysis, lack consistency, complicate external benchmarking and are difficult to standardize at the industry level. Together, these distinctions position SBSS as a feasible bridge between legacy TRIR metrics and more meaningful, severity-driven evaluation of safety performance.

For example, a fatality might be given a weight of 1.00, whereas minor first aid incidents might receive weights as low as 0.05. (Note: While TRIR excludes first aid cases, the SBSS model includes graduated severity values for first aid incidents for companies that internally track total harm incident rates.) This ensures compatibility with TRIR while offering deeper insights for organizations that go beyond regulatory minimums. This adjustment provides a more accurate accounting of the true impact of workplace incidents.

The importance of this reform cannot be understated. Hallowell et al. (2021) note that "TRIR is used in many ways to measure safety performance, from the worksite to the boardroom." This broad usage, however, belies the

metric's inability to account for the qualitative differences between incidents. TRIR's simplicity in counting recordable events without weighing severity has contributed to a distorted picture of safety, incentivizing companies to focus on reducing the number of incidents rather than addressing underlying causes. As Dekker (2017) succinctly observes, "What gets measured gets manipulated." Many organizations have turned safety reporting into a numbers game, striving to achieve arbitrarily low TRIR scores by underreporting or reclassifying incidents.

Lately, scholars and industry experts have argued for a more nuanced approach (Hallowell et al., 2021). Through a sliding scale, safety professionals can capture not just the frequency but also the severity of incidents. A well-designed SBSS model directly addresses the shortcomings of TRIR by ensuring that serious incidents (i.e., fatalities and permanent disabilities) are weighed appropriately compared to minor injuries such as strains and sprains.

By effectively combining quantitative rigor with qualitative nuance, the SBSS should significantly enhance workplace safety monitoring, lead to more targeted and effective interventions, and foster a genuine culture of safety improvement.

Historical Context & Limitations of TRIR

Since the passage of the OSH Act in 1970, regulatory bodies have sought reliable methods to measure and compare workplace safety performance. TRIR provided a simple, standardized means of calculating incident frequency. TRIR is traditionally calculated as:

$$TRIR = \frac{(Number\ of\ recordable\ incidents\ \bullet\ 200{,}000)}{Total\ hours\ worked}$$

This formula became ingrained in corporate safety protocols and external reporting systems. Initially, TRIR served an important role: it allowed companies, investors and regulators to quickly assess the safety record of a business. However, as industries evolved and safety management practices became more sophisticated, TRIR's limitations began to emerge.

One of the primary criticisms is TRIR's one-dimensional focus on frequency, with no regard for the severity or impact of each incident. In TRIR's formulation, every recordable event is assigned a unit value of 1. This means that any incident that requires treatment beyond first aid is treated on par with a life-ending incident. It is widely acknowledged that TRIR's failure to account for severity can then lead to misinterpretations of safety performance, which can lead to unintended consequences. As organizations increasingly link safety performance to financial incentives, reputational considerations and regulatory compliance, there is significant pressure to show low incident counts. This pressure often results in the suppression of incident reporting, particularly for less severe events, creating an inaccurate picture of workplace hazards. Furthermore, TRIR's simplistic quantitative focus neglects qualitative insights. For instance, a company might report a low TRIR while suffering from hidden systemic issues—such as a high risk of severe incidents—undetected by the metric.

To illustrate TRIR's inability to reveal underlying operational risk, consider the following example. A manufacturing plant operates high-pressure chemical reactors and reports no recordable injuries for the year, yielding a TRIR of 0.00. Yet this apparent "perfect" performance can easily mask substantial hazards. Several latent conditions may exist that pose a high potential for catastrophic failure but remain invisible to TRIR, which counts only OSHA-recordable outcomes and not the precursors that drive severe events, such as:

- **Aging equipment.** Critical pressure relief valves are past their recommended service life, increasing the risk of catastrophic failure.
- **Near-miss normalization.** Operators frequently experience close calls involving pressure spikes and minor leaks but do not report them, either because there is no injury or because of a culture that discourages "complaining."
- **Training gaps.** New hires are inadequately trained on emergency shutdown procedures for the reactors, a latent issue that might only surface during a major incident.

Consequently, decision-makers are misled about the real state of safety, which often leads to superficial fixes rather than substantive long-term improvements.

Despite the well-recognized shortcomings of TRIR, any movement toward a severity-based model must acknowledge the practical realities of implementation. TRIR remains deeply embedded in regulatory reporting systems, contractor prequalification platforms, client scorecards and corporate incentive structures, which means organizations often lack the flexibility to abandon it even when superior alternatives exist. Adopting severity-based measures such as SBSS requires navigating cultural resistance from leaders and supervisors who have spent decades equating safety performance with a low TRIR, as well as addressing legitimate concerns about training, data governance and compatibility with legacy systems. For this reason, severity-based metrics must be introduced in a way that complements rather than disrupts existing reporting obligations. Positioning SBSS as a bridge metric allows organizations to maintain compliance while gradually shifting toward a more meaningful and transparent understanding of risk. This balanced, phased approach reflects how safety metrics must function in real-world environments where operational, contractual and regulatory pressures shape what change is realistically attainable.

Despite its flaws, TRIR remains deeply embedded in industry practice and regulatory reporting. OSHA, ISNetworld, and other systems rely heavily on TRIR for benchmarking and compliance checks. As Hallowell et al. (2021) note, the ubiquity of TRIR contributes to its continued use. The metric's standardization has enabled comparisons across different organizations and industries. Work practices and safety standards have evolved over the past 55 years, and the one-dimensional TRIR metric no longer serves the modern workplace. A more nuanced approach is required—one that not only counts the number of injuries but also qualitatively evaluates their severity. This need sets the stage for the introduction of the SBSS, which seeks to reframe safety metrics

in a way that reflects the true impact of workplace incidents. A sliding scale allows safety performance to be measured more holistically, driving more effective safety interventions and improvements.

The Emergence & Theoretical Underpinnings of SBSS

The theoretical shift from a simple count-based metric to a severity-weighted metric represents an important evolution in safety measurement. The core idea behind the SBSS is to assign a value that reflects the real-world impact of an incident. Instead of treating all incidents uniformly, the SBSS model assigns each a weight based on severity. Whereas TRIR might give a fatality and a minor injury the same numerical weight, the SBSS model recognizes that a fatality, with a weight of 1.00, indicates a far more consequential failure in safety performance than an incident that results in minor medical aid, which might be assigned a weight of 0.40.

A proposed severity scale might include the values and rationales listed in Table 1. These weightings reflect both the immediate human cost and the longer-term financial and operational impacts of the injuries. For instance, a permanent disability not only affects the immediate well-being of an employee, it has cascading effects on productivity and long-term resource allocation. By recognizing these nuances, SBSS provides a comprehensive picture of safety performance. The weightings are grounded in a combination of ethical, operational and financial considerations, reflecting the proportional impact of each incident on employee well-being, organizational function and safety culture.

Within the SBSS framework, it is important to account for cases where incidents involving modified duties result in greater operational and financial impact than medical aid cases, particularly those involving soft tissue injuries (e.g., lumbar strains, ankle sprains) that necessitate extended periods of modified work. To improve the resolution of severity scoring, the SBSS structure could incorporate cumulative modified duty days as a weighted input. For example, incorporating a nominal severity coefficient such as 0.001 per day on modified duties would provide a more continuous and granular severity profile, thereby enhancing the metric's sensitivity to low-impact but high-duration cases and supporting a more accurate reflection of overall safety performance.

The adoption of a weighted system for incident reporting has a sound theoretical basis. It follows the broader trend in risk management and decision analysis where qualitative differences are quantified to aid in prioritization and decision-making. Research by Hallowell et al. (2021) underscores the limitations of a non-weighted approach and supports the idea that not all incidents should be considered equal. Studies have demonstrated that a severity-weighted approach can improve the sensitivity of safety metrics, enabling managers to focus on interventions that truly reduce risk.

The theoretical underpinning also draws from the principle of "value of information" in risk management. By accurately weighting the severity of incidents, companies gain data that better represent their actual risk profile. This not only enhances internal decision-making but facilitates fairer comparisons across companies and industries.

One of the key strengths of the SBSS proposal is its potential for a smooth transition. Rather than discarding the TRIR framework entirely, the SBSS augments it in a hybrid model by leveraging the familiarity and established regulatory compliance of TRIR while addressing its critical shortcomings. The "bridge metric" concept is essential for gaining industry and regulatory acceptance. Decision-makers are more likely to adopt changes that build on existing systems rather than require an entirely new paradigm.

TABLE 1
SEVERITY SCALE BY INJURY

Injury type	Severity weight	Rationale
Fatality	1.00	Represents the ultimate failure in safety systems and irreversible loss
Permanent disability	0.95	Long-term loss of function or capability; near-total impact
Lost-time injury	0.85	Disruptive to productivity; indicates serious injury requiring recovery
Serious medical aid	0.60	Non-life-threatening but requires clinical intervention
Minor medical aid	0.40	Treated by licensed personnel; limited impact on work capability
First aid	0.10	Basic, immediate care given to an injured or ill person

What Is a Bridge Metric?

A bridge metric is an interim, compatibility-first measure that augments a widely used legacy metric without replacing it so organizations can improve decision quality without disrupting regulatory, contractual or cultural dependencies. In the context of SBSS, a bridge metric preserves TRIR's familiar form and denominator (per 200,000 hours), adds fixed outcome-based severity weights to address TRIR's frequency-only blind spot, and enables immediate adoption through side-by-side reporting (TRIR + SBSS) with minimal change-management burden. Because its weights are centrally governed, standardized, auditable and non-editable at the project level, the SBSS bridge metric can enhance transparency and reliability while reducing the need for major system redesign or retraining. Its purpose is explicitly transitional, and enabling it creates immediate decision value while allowing organizations to mature gradually toward richer indicator suites such as SBLIs and leading indicators.

The anticipated outcomes of adopting SBSS are significant:

•**Improved accuracy.** By reflecting the true cost of incidents, the SBSS provides a more accurate measurement of safety performance.

•**Enhanced transparency.** With severity weighting, both internal and external stakeholders gain a clearer picture of risk, enabling better resource allocation and improved preventive measures.

•**Better industry comparisons.** Companies operating in different risk environments can be compared on a more level playing field, as the severity of incidents is more fairly accounted for.

•**Focus on critical issues.** Management can better prioritize interventions by identifying the areas where the most severe incidents are occurring, rather than chasing reductions in total incident numbers.

•**Ethical consideration.** The highest weights are assigned to events with the most severe human consequences, reflecting ethical prioritization of life and long-term health.

•**Operational disruption.** Incidents that significantly disrupt operations (e.g., long-term injuries and permanent disabilities) carry higher weights to reflect downstream business impacts.

•**Financial cost.** According to the National Safety Council (2023), the severity of injuries related to construction work has a direct impact on the total incurred costs of workers' compensation claims. For example, the cost of amputations averages $120,077 per claim, while fractures and crush injuries cost approximately $63,531. These costs highlight the financial burden of severe injuries.

•**Industry benchmarking.** Weightings are aligned with severity classification schemes used in safety-critical industries, such as aviation and oil and gas, where quantifiable risk modeling is standard.

•**Expert consultation.** While empirical validation has not yet been conducted, the initial weightings presented serve as a conceptual starting point, based on input from safety professionals. These preliminary values are intended to support the thesis framework rather than represent finalized or data-validated metrics.

•**Regulatory classification standards.** Severity categories are informed by the Occupational Injury and Illness Classification System developed by the BLS (2023), which standardizes injury and illness types for use in workplace reporting and analysis.

Pilot-Friendly Practical Steps for Employers

The primary advantage of a severity-weighted system is its feasibility for immediate adoption. It is essentially an evolution of an existing framework. To facilitate the transition, organizations should conduct pilot studies that compare traditional TRIR outcomes with severity-weighted metrics.

TABLE 2
INCIDENT PROFILES OF TWO COMPANIES USING TRIR

Company	Fatality (1.00)	Permanent disability	Lost-time injury (0.85)	Serious medical aid	Minor medical aid	Traditional TRIR calculation
A	1	1	5	0	0	Total incidents = 7 TRIR = (7 • 200,000) / total hours worked
B	0	0	1	1	5	Total incidents = 7 TRIR = (7 • 200,000) / total hours worked

TABLE 3
INCIDENT PROFILES OF TWO COMPANIES USING SBSS

Company	Fatal (1.00)	Permanent disability (0.95)	Lost-time injury (0.85)	Serious medical aid (0.60)	Minor medical aid (0.40)	SBSS total weighted score
A	1	1 • 0.95	5 • 0.85 = 4.2	0	0	Total incidents = 6.2 TRIR = (6.2 • 200,000) / total hours worked
B	0	0	1 • 0.85	1 • 0.60	5 • 0.40	Total incidents = 3.45 TRIR = (3.45 • 200,000) / total hours worked

Developing a reliable SBSS system involves several steps:

•**Data collection.** Gather detailed injury data, including the type, severity and contextual factors surrounding each incident.

•**Weight assignment.** Establish severity weights using expert consensus and empirical data. Peer-reviewed research and industry benchmarks can help establish standardized weights.

•**Normalization.** Integrate the weighted values into a familiar metric format (e.g., incidents per 200,000 work hours) to allow for easy comparison with traditional TRIR outcomes.

•**Validation.** Pilot the system in a controlled environment to validate whether the severity weights appropriately reflect real-world impacts, adjusting as necessary based on feedback and comparative analyses.

These steps ensure that the SBSS is not only theoretically sound but empirically validated before being recommended for widespread adoption.

Consider the following hypothetical comparison between two companies in high-risk industries, such as construction and manufacturing. The companies operate in similar environments, each reporting seven incidents over the same period and both reporting 1 million hours worked. Under traditional TRIR, both companies appear identical. However, their incident profiles, shown in Table 2, differ markedly.

When the TRIR is recalculated using SBSS's weighted values (assuming 1 million work hours), it becomes clear that Company A's safety metric is significantly higher than Company B's. This outcome shows how a severity-weighted approach gives a more accurate picture of actual safety performance. Table 3 and Figure 1 illustrate how SBSS can differentiate performance metrics that TRIR would otherwise mask.

Both firms look identical in terms of TRIR (1.40), but SBSS differentiates their risk profiles (1.24 vs. 0.69), making incident severity visible to decision-makers. The stark difference in severity-adjusted scores drives home the point that not all incidents carry equal weight, and that SBSS helps differentiate between organizations with similar incident counts but vastly different safety profiles.

Traditional TRIR often unfairly penalizes companies in sectors with a higher likelihood of minor incidents. For example, a manufacturing plant with frequent minor injuries may record a high TRIR despite an absence of severe incidents. Conversely, a construction company with fewer incidents—but with one or two catastrophic events—might appear similarly risky under TRIR. With SBSS, minor injuries have a limited effect on the overall safety score, while serious incidents carry greater weight.

When severity is emphasized, organizations are forced to address systemic issues that might otherwise be hidden behind a facade of low incident counts. This level of differentiation ultimately empowers companies to make more informed, data-driven decisions about where to invest in safety improvements.

From the hypothetical comparisons of the two companies, two key lessons emerge:

•Visualizations and clear data dashboards help all stakeholders—from workers to regulators—understand and trust the metrics.

•SBSS is most effective when paired with continuous improvement initiatives. Regular audits and feedback loops help refine both the weightings and the overall safety strategy.

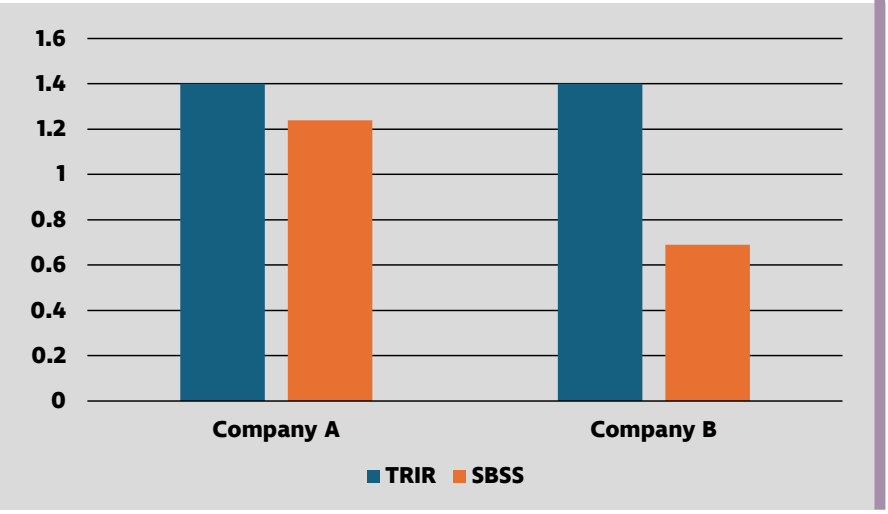
Stakeholder Impact: Industry, Regulatory Bodies & Worker Safety

Adopting SBSS may enhance business performance in several critical ways. For industry leaders, safety metrics are not just numbers; they are indicators of operational risk, productivity and overall corporate reputation. Traditional TRIR metrics have long been used by insurers and investors as part of risk assessments. However, by switching to SBSS, companies can paint a more accurate picture of their actual safety performance. This not only helps in tailoring internal safety programs, it offers more credible data for external stakeholders.

A severity-based system can mitigate the numbers game where companies report deceptively low incident numbers by underreporting or reclassifying incidents. With SBSS, both severe and minor incidents are logged, but their impacts are clearly differentiated. This creates stronger incentives for addressing critical safety gaps and leads to targeted interventions that reduce the risks of catastrophic incidents.

Regulatory agencies such as OSHA have long relied on TRIR for monitoring workplace safety. The

FIGURE 1
TRIR & SBSS FOR TWO COMPANIES



introduction of SBSS could represent a significant shift in how safety performance is reviewed. On one hand, regulators may be cautious about changing long-established metrics; on the other, a severity-based system would align closely with the evolving understanding of risk management.

OSHA's interest in leading indicators—data that predict potential hazards rather than merely reflecting past incidents—suggests that a metric capable of capturing incident severity would be of great benefit. Moreover, enhanced transparency in safety reporting helps regulatory bodies better target inspections and enforce safety standards.

For employees, the adoption of SBSS means that all incidents are recognized in a manner that truly reflects their impact. Rather than being incentivized to hide minor injuries, workers in an SBSS environment are more likely to report incidents accurately, knowing that the system does not penalize them by lumping all injuries together. This can lead to a more open, honest safety culture and reduce fear of reprisal—a shift that is essential for the proper identification of risk factors. In addition, when severe incidents are given the weight they deserve, management is compelled to implement more rigorous and effective safety programs. This means that SBSS does not merely alter reporting practices, it transforms the entire safety culture by emphasizing the severity rather than the number of incidents.

A more precise metric offers organizations significant financial benefits. With SBSS, companies can better allocate resources, focusing on areas where severe risks are concentrated rather than dissipating effort on superficial reductions of incident count. Insurance companies could respond by offering premiums that more closely reflect the true risk environment. Companies with lower severity scores, even if incident counts are similar to those of industry peers, are positioned as safer and more attractive to potential partners, clients and investors.

Industry stakeholders, including contractors, insurers and regulatory bodies, tend to be conservative when it comes to changing long-standing practices. Nonetheless, the incremental nature of implementing SBSS as an enhancement rather than a complete replacement of TRIR makes it a more palatable alternative. By emphasizing that SBSS builds upon familiar frameworks, proponents can ease the transition and foster consensus.

Stakeholder engagement through advisory boards and pilot programs can also facilitate smoother adoption. Early adopters and industry leaders can serve as exemplars, demonstrating how SBSS offers better data for predictive modeling, improved safety interventions and, ultimately, a more resilient organization.

Despite its merits, any change to deeply ingrained reporting systems will encounter resistance. The primary objections often stem from fears of increased complexity or potential misuse of data. However, careful planning—such as ensuring data transparency, providing robust training and establishing clear, standardized severity weights—can address these concerns. Engaging all stakeholders in the development and pilot-testing process is key to mitigating resistance.

For many industry observers, the SBSS is not a long-term experimental concept; it is an immediately actionable solution that provides clear advantages without requiring an overhaul of current systems. The benefits of increased transparency, improved worker reporting, and better prioritization of safety resources based on consequence severity rather than incident frequency alone make a compelling argument for immediate adoption.

The preference for SBSS over SBLI stems from its practical alignment with legacy TRIR systems. Industry stakeholders, especially those managing compliance and reporting, favor systems that do not require significant reeducation or a total infrastructure overhaul. SBLI, while conceptually robust, often demands frequent reconfiguration, varying consequence definitions and specialized training. This leads to inconsistent application and difficulty in comparing safety performance across companies or projects. In contrast, SBSS reduces the risk of misclassification by assigning fixed severity values to objectively defined outcomes, such as fatalities or modified duty cases. This consistency enhances transparency, improves trust during audits and accelerates industry-wide benchmarking. Moreover, SBSS simplifies external communication with regulators, investors and clients. While SBLI may require detailed explanation or supplementary documentation, SBSS keeps the conversation grounded in familiar terminology while still enhancing the quality of information conveyed.

Challenges, Counterarguments & the Path Forward for Safety Metrics

Despite its many advantages, the SBSS system is not without potential drawbacks or challenges. These may stem from:

- **Cultural resistance.** Companies accustomed to the simplicity of TRIR might be hesitant to adopt a system that appears more complex.
- **Data integrity concerns.** Accurate severity weighting requires rigorous data capture and reporting practices, and there is a risk that inconsistent classification might undermine the system's credibility.
- **Regulatory hurdles.** As regulatory agencies have long relied on TRIR, a shift to SBSS may require significant lobbying and demonstration of benefits.
- **Implementation costs.** Upgrading systems and training personnel can entail upfront investments that some organizations may be reluctant to make.

Critics sometimes argue that introducing a severity-weighted system could skew incident ratings to place companies in a more favorable light, potentially downplaying worker injuries. However, such a critique misses the point of SBSS. The intention is not to minimize injuries but to represent them accurately. By providing a differentiated view, SBSS exposes the true nature of workplace risks rather than offering a false sense of security.

Another common counterargument is that adding more layers of complexity could lead to confusion and variability in reporting. This concern can be mitigated by developing standardized guidelines and robust

training programs. As demonstrated earlier, a clear, established severity scale (tested and supported by expert consensus) can ensure that the system remains accurate and consistent.

Ensuring that all stakeholders, especially safety professionals, supervisors and workers, understand the new metrics is an additional challenge in shifting from TRIR to SBSS. Comprehensive training programs are necessary and should focus on:

- the rationale behind weighting injuries by severity
- how to accurately record incidents with the associated severity classifications
- interpreting the new metrics and using them to drive safety improvements

Workshops, online modules, and interactive dashboards are critical to achieve acceptance. Moreover, explaining the benefits of SBSS—such as improved accuracy in reflecting the actual risk environment—may help counter resistance.

To foster industry-wide adoption of SBSS, proponents should consider the following:

- **Pilot programs.** Engage early adopters in pilot studies that validate the benefits of the severity-weighted approach in real-world settings.
- **Stakeholder engagement.** Create advisory committees that include regulators, industry experts, safety professionals and frontline workers to collaboratively refine the model.
- **Transparent communication.** Use data visualization and clear communication strategies to explain how SBSS works and why it yields more accurate results.
- **Integration with existing systems.** Stress that SBSS is an evolution of, rather than a revolution against, TRIR. Building on familiar frameworks allows for a smoother transition.
- **Demonstration projects.** Publicize successful case studies and cost-benefit analyses that illustrate financial and safety improvements resulting from implementation of SBSS.

While SBSS offers an immediate and practical improvement over traditional TRIR, it can also serve as a stepping stone toward even more comprehensive safety metrics. Over time, organizations may integrate SBSS with leading indicators and advanced predictive analytics (akin to SBLI) to construct a truly holistic safety management system. Such a system would not only measure past incidents but forecast potential risks and guide proactive measures.

An effective safety metric system must balance quantitative data (incident counts and weighted scores) with qualitative insights (employee feedback, risk assessments and near-miss reports). By design, SBSS enhances quantitative measures by adding a severity dimension. However, it should be complemented by qualitative studies that investigate why severe incidents occur in the first place. Only then can organizations address the root causes rather than merely measuring their effects.

For SBSS to gain traction, it is imperative that those implementing it work collaboratively with both government regulators and industry associations. Aligning SBSS with existing guidelines—such as those from

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OSHA, the Canadian Construction Safety Council (CCSC) and ASSP (2022)—can lend credibility and ensure smoother regulatory acceptance. Involving influential bodies early in the process can pave the way for nationwide (or even international) standardization.

Finally, the field of safety metrics should remain open to continuous improvement. As data collection technologies improve and more nuanced analyses become possible, the SBSS model can be further refined. Future research might focus on sector-specific adaptations of the severity scale or on integrating real-time data analytics to enable dynamic safety management.

While replacing TRIR with the SBSS metric may involve challenges and pushback, the long-term benefits related to improved safety, more accurate risk profiling and enhanced worker protection make a compelling case for its adoption. If the long-term goal is regulatory adoption or replacement of TRIR, SBSS offers a

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strategic bridge. It builds on a language that OSHA, ISNetworld, and many industry compliance platforms already understand. SBLI, on the other hand, though insightful for internal continuous improvement, demands a full redefinition of performance evaluation standards. This makes it a heavier lift for both regulators and companies.

SBSS is not about throwing away the old system, but making it smarter. Agencies can adopt it incrementally, test it through pilot programs, and maintain compatibility with existing databases and reporting tools. This makes SBSS significantly more viable as the foundation for policy reform than the relatively abstract and less-standardized SBLI. In essence, SBSS balances innovation with institutional inertia—modernizing safety evaluation in a way that is scalable, comprehensible and regulatory-ready.

Future research could focus on customizing the SBSS framework for heavy industrial construction, a sector characterized by unique operational hazards such as crane operations, confined space entries and complex multicontractor interfaces. Such a study would:

- identify common severe incident scenarios specific to industrial construction (e.g., load drops, trench collapses, scaffold failures, heavy equipment rollovers);
- develop a tailored severity scale weighting of these incidents based on potential outcome severity and exposure frequency in this sector; and
- compare SBSS results to TRIR trends on several live projects to measure the improved risk visibility and decision-making support provided by SBSS.

This research would test whether a sector-specific SBSS reveals risk trends obscured by TRIR and whether it leads to earlier, more effective interventions.

Conclusion

The evolution of workplace safety metrics reflects the broader shifts in how organizations manage risk and prioritize the well-being of employees. Traditional metrics such as TRIR have served as useful benchmarks over the past five decades. However, as the complexities of modern work environments have grown, so too has the inadequacy of TRIR for measuring risk. TRIR's one-dimensional approach obscures the true risk landscape: by counting every incident as equivalent, regardless of severity, it encourages behaviors that ultimately undermine safety.

This article argues for the adoption of the SBSS as a more effective metric for evaluating workplace safety. The evidence supports the conclusion that SBSS not only offers greater precision, it fosters a more transparent and proactive safety culture. By incorporating a sliding scale of severity, the SBSS model provides a nuanced representation that aligns closely with ethical imperatives and practical necessities. It recognizes that not all incidents are equal and that the human, financial and operational costs of severe incidents far outweigh those of minor injuries. Moreover, by integrating SBSS into existing reporting frameworks, organizations can benefit from a bridge metric that retains the familiarity of TRIR while significantly enhancing the interpretive power of the data.

For companies, SBSS offers the promise of better resource allocation, more targeted safety interventions and an improved corporate reputation. Regulatory bodies also stand to gain, as a more accurate safety risk metric allows for more effective oversight and enforcement of safety standards. Perhaps most importantly, workers will benefit from a system that encourages transparency and honest reporting, leading to real improvements in workplace conditions and overall safety culture.

Continuous collaboration between industry leaders, regulators, and researchers is essential to further refine and standardize these metrics. Future research should aim to integrate SBSS with leading indicators and real-time data analytics, creating a dynamic safety ecosystem that continually adapts to new challenges and opportunities. Only by embracing comprehensive approaches such as these can we hope to build truly safe and resilient work environments for the future. **PSJ**

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