A Practical Guide to

SAFETY PERFORMANCE INDICATORS

SPIs

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Worry less, know more with SPIs.

Safety Performance Indicator (SPI)

➤ ### ICAO Definition:

A "data-based safety parameter, used for monitoring & assessing safety performance."

➤ ### In Practice:

A quantitative measure of an element of your operation* that can be used to evaluate your current level of safety and indicate progress toward a Safety Objective.

e.g., deviations to duty or rest periods, safety meetings held, etc.

Know what to look at.

SPI data will allow you to keep tabs on performance and provide you with warning signs of potential risks. SPIs trending in an undesirable direction will indicate what you might need to focus on first where current safety programs may not be working effectively.

Know your trends.

Consistently tracking and monitoring the same elements makes it easy to identify trends over time, especially when using a digital platform to automate the process. You can quickly see what changes you need to make and whether the changes you have already made are having the desired effect.

Know what to do.

Impressions can be misleading. Often what we remember as the most important thing is not necessarily the case. Data allows you to make objective and informed decisions about your procedures, policies, and safety so you can ensure your efforts are going to the things that will have the greatest impact.

Know your progress.

Numbers speak volumes, and it is far easier to track progress toward a safety goal when you have an objective measure to compare against. Also, when seeking approval from accountable executives for changes, having data to justify your requests can really help.

How do you develop SPIs?

When developing SPIs it is important to take a holistic approach, as a single SPI cannot tell the whole story. A single SPI only monitors a specific item of your operation and does not provide enough context to make conclusions. It is only when your SPIs are analyzed together that they can indicate improvements and deficiencies in safety performance.

SPIs can be thought of in much the same way as vital signs during a doctor's visit. A doctor measures your heart rate, cholesterol level, blood pressure, and other indicators that monitor a single part of your physiology. However, by itself a measurement, like blood pressure, cannot tell you if you are healthy or not. Only when multiple elements are analyzed together can they describe your overall health.

Don't have SMS yet?

Check out our Guide to Easy and Practical SMS Implementation.

gonimbl.com/get-your-sms-guide

Characteristics of Good SPIs

In general, SPIs should:

Support a Safety Objective

Supporting an objective is important as it gives the SPI a "purpose". Tracking and monitoring an SPI that stems from your existing safety objectives will ensure it has a practical and positive impact on the elements of safety performance you have determined to be the most important. This will avoid the act of simply "counting numbers" just for the sake of it.

Have safety relevance

An SPI must be relevant to the actual risks your department faces, otherwise tracking it would be wasting time and effort. This means the risks you are trying to address have been identified by a formal or informal process.

Be objective and data-based

Data speaks volumes; by having numbers to back up progress toward a goal, it will be easier to make decisions and clearly see how your SMS efforts are impacting safety.

Have a target

Set a target for where you want your SPI to go based on data you already see in your SMS or your best judgment and any prior experience if you don't have SMS data.

Be able to be tracked against time

Setting a timeframe is critical as it lets you identify trends and see progress over time. A measurement of your height at one age can't tell you if you are growing taller.

Where to start

SPIs should be based on the Safety Objectives you define, the risks identified in your Safety Risk Profile, and existing SMS data (if available).

If you already have some of these items, you can skip a few of the steps below. However, if you are starting completely from scratch, you can use the full process.

01

Prepare a Safety Risk Profile

The first place to start is preparing a Safety Risk Profile. The Safety Risk Profile is a high-level overview of the major areas of risk your department faces by identifying and evaluating the potential hazards your team is exposed to in their day-to-day operations. The Safety Risk Profile also allows you to plan mitigations to help reduce the impact of those risks.

02

Define Safety Objectives

After you have identified the risks in your Safety Risk Profile, plan out Safety Objectives, also referred to as Safety Goals. Safety Objectives can be thought of as your SMS's current "mission"; these objectives should be targeted to address areas of concern that the department wishes to improve upon. Look at your Safety Risk Profile to help you choose these objectives.

For additional resources, check out our blog post: How to Set Safety Goals.

03

Choose your SPIs

Determine the data points that describe your progress toward your objectives.

Now that you know your Safety Objectives, it's time to choose the "vital signs" that you will use to monitor progress toward the objectives. Think about each goal and how you might describe to someone how they could tell if you are making progress.

For example, if you are still working back up to a full operating schedule or have several new team members, having the appropriate recency for performing duties may be a risk your department is facing. You then have a Safety Objective to reduce the number of employees with a lack in recent experience to below 25% by the end of the year. One SPI that can help measure progress is the number of deviation reports submitted per quarter for operations where team members have recency below the minimums stated in your department procedures, with a goal of less than 2.

Additionally, if available, you can use your existing SMS data to help you select SPIs. If you've noticed some trends or events with certain airports, regions, vendors, etc., then targeting an SPI to monitor the problem area can bring more attention to them.

SPIs

04 Check your SPIs for diversity

High and Low Consequence Items
SPIs should be selected to monitor both the "worst case scenario" but also items of lower consequence. These nuisances or "not so bad" incidents can add up and have significant impacts. In the world of SPIs, these are called low- and high-consequence indicators.

 • **Low-consequence indicators:** Incidents, deviations, or other events that would cause minor injury, damage, or disruption to operations.
 • **High-consequence indicators:** Incidents, deviations, or other events that would cause moderate or greater injury, damage, or disruption to operations.

Positive and Negative Trends
SPIs should not just track "negative" safety occurrences. Positive outcomes and efforts of your safety objectives should also be tracked, such as personnel proactively identifying risks that might impact operations or contributions to ideas for mitigations. Remember you are looking for deficiencies and progress toward success.

Passive and Active Indicators
Try to select both passive and active indicators. This will ensure you are proactively monitoring safety and not just waiting to react after something happens. A core element of SMS is to become predictive about safety so both types of indicators are important.

 • **Passive:** An indicator that is recorded after an event has occurred. (e.g., crewmember reports of traffic conflicts, maintenance technician reports of non-calibrated tools, etc.)
 • **Active:** An indicator that can be recorded at any time. (e.g., the number of safety meetings held, read & initial items distributed, internal audits conducted, internal training conducted, etc.)

All Department Areas
SPIs should cover all areas of your operation including maintenance, ground operations, flight operations, dispatch, and administrative. Everyone involved in your operation is part of the mission to ensure you are operating safely, so it is critical to not limit your data to only one aspect or role within the operation.

04 Set Targets and Triggers

TARGETS

Setting targets for SPIs means specifying a minimum, maximum, or number of occurrences, percentage, or other metric within a specified time frame that you are aiming to achieve.

TRIGGERS

Setting triggers for SPIs means specifying a minimum, maximum, or number of occurrences, percentage, or other metric within a specified time frame that you are trying to avoid.

A trigger can be thought of as an anti-target.

Having targets allows you to measure progress and track how effective your efforts are while having triggers ensure you have a backup warning system to alert you to any areas that may be going awry or factors having a negative impact on your safety objective.

To set a target or a trigger you can use existing SMS data, research, and/or prior experience. Look back at how many times that event has happened in the past, how often it happens to fellow operators, or how often it would reasonably occur based on your experience, then select a target to aim for or trigger to avoid.

For example, if you have observed 4 runway incursions over the last year, you may want to set your SPI to reduce the number of runway incursions to 2 per year.

If you do not have any past data to set your targets and triggers, take your best guess. The targets and triggers can always be adjusted as you start monitoring and receiving data.

Be sure to keep your targets and triggers reasonable within the context of the real world. While it is ideal, a target of "0 occurrences" is not realistic and hard to track positive or negative progress against.

SPI Development Examples

Flight Department Deviations Example

01 **Prepare a Safety Risk Profile**   You have a lot of new personnel and expect that not everyone will be experienced in your company's procedures.

02 **Define Safety Objectives**   You are noticing or anticipating more instances of inadvertent deviations from prescribed procedures as new personnel get used to your department. Therefore, you create a Safety Objective to decrease deviations from company policies and procedures over the next year.

03 **Choose your SPIs**   To monitor progress toward your safety objective, you select two SPIs:

- Number of procedural compliance discrepancies found during internal audits.
- Number of reported procedural deviations.

04 **Check your SPIs for diversity**   The number of discrepancies found during audits is an active SPI that can be measured at any time.

The number of reported procedural deviations is a passive SPI that can only be measured when it is reported.

05 **Set Targets and Triggers**   Your target for the SPI monitoring the number of discrepancies found during internal audits related to procedural compliance is less than 6 per year, with a trigger of 10 per year.

Your target for the SPI monitoring the number of reported deviations is 4 reports per year, with a trigger of 8 reports per year.

SPI Development Examples

FBO Fuel Procedure Example

01 **Prepare a Safety Risk Profile**

You feel that there have been too many incidents of fuel spills lately. Upon checking your existing safety data you find that there have been 4 spills for every 100 fueling events.

02 **Define Safety Objectives**

You decide to reduce the incidents of fuel spills by half over the next 12 months.

03 **Choose your SPIs**

To monitor progress toward your safety objective, you select two SPIs:

• Number of occurrences of fuel spills by your FBO's personnel.
• Number of occurrences of fuel spills by contract personnel providing fueling services to your customers.

04 **Check your SPIs for diversity**

These SPIs are low-consequence, negative, passive indicators focused on line personnel and vendors. They should be paired with other SPIs that are high-consequence, positive, and/or active indicators.

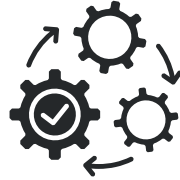**05** **Set Targets and Triggers**

Your target for this SPI is 2 spill incidents per 100 fueling events, for both FBO personnel and vendors.

Examples of SPIs

Safety and Operational Management

Number of safety **communications published** in the last month, with a **goal of 2**

Percentage of **organizational changes** for which a formal **safety risk assessment** has been performed over the past year, with **a target of 90%**

Average number of **findings** per audit, with a **target of 2**

Percentage of **changes to Standard Operating Procedures** (SOPs) for which a formal **safety risk assessment** has been performed over the last manual revision cycle, with a **target of 95%**

Number of safety risk management **training events performed** over the past two years, with a **target of 5**

Examples of SPIs

Operational Events

Number of **deviations to maintenance duty** or **rest periods** per month, with a **target of 3**

Number of **deviations to company policies** or **procedures** with a trigger of **6% of reports** for which **feedback to reporter was provided within 10 working days** over the next year, with **target of 90%**

Number of **internal audit activities** per year, with a **target of 10**

Number of **deviations to crew flight, duty,** or **rest periods** per quarter, with **a target of 2**

Number of **safety reports** received, with a **target of 10 per quarter**

A digital platform is the easiest way to track SPI data. All of these example SPIs can be tracked using the Nimbl SMS platform. Contact us to learn more: info@gonimbl.com or +1-240-546-4030

What to do after you set your SPIs

01 Start collecting data

Once you have your SPIs in place, your next step is to simply collect and watch the data. Remember, a snapshot is nice, but not fully informative to how you are doing. The current number alone does not provide enough information for a trend analysis and safety performance evaluation. It is vital to compare the values over time to see where the data are trending.

02 Record data at appropriate intervals for several periods

Record data at intervals appropriate for each SPI. This may be calendar based (monthly, quarterly, etc.) or based on an event (per 20 landings, per 50 flight hours, etc.). Record multiple intervals before doing your first analysis. If you have existing SMS records, you may be able to pull historical SPI data and begin an initial analysis immediately.

Over time as you record more and more interval periods, the more informative your data will become.

Additionally, depending on the SPI, if you have multiple aircraft or types, you may want to review aircraft and flight related SPIs separately for each aircraft or type. This could help to determine if safety issues are related to a specific aircraft or the unique operations of a particular aircraft and narrow your goals to applicable aircraft. For example, your older aircraft that has had continued maintenance issues may have a goal to reduce the number of open MEL items per flight per year, with a target of 1.

03

Look for trends and triggers

After you have enough data collected you can then look at the trends. In general, you can use the process below to complete your analysis.

Do your calculations
Calculate the appropriate values for each SPI (e.g., calculate the total, percentage, rate, etc.).

Review your results
Compare your calculated results against the target values to identify new possible hazards and review the effectiveness of implemented mitigations.

Values trending toward target values indicate the mix of activities you are doing are likely having the desired effect.

Values trending away from target values or toward trigger values indicate that you may have issues with the mitigations you put in place. This could indicate that:

• Existing mitigations are not fully or properly implemented
• Existing mitigations are not the mitigation needed or need updates
• Additional mitigations need to be added to existing ones

04

Share your progress

You should regularly share progress with your whole team. This celebrates the progress of everyone's efforts and informs your team about additional things to monitor. Highlighting the work everyone is doing will demonstrate that the organization recognizes and values safety, thereby strengthening your organization's safety culture.

This can be done with simple regular safety updates for smaller organizations or more formal safety meetings for larger organizations. In general, operators will hold between 2-4 safety reviews a year, covering items like:

• Safety goals and objectives
• SPI trends
• Successes
• Current and new mitigations
• Fatigue management
• Review of new incident reports
• Review of recently addressed incident reports

05

Monitor for Relevance

As policies, procedures, and safety objectives change, the SMS matures, and your department evolves, SPIs and target / trigger values will need to be adjusted to remain relevant. Periodically review relevant SPIs and evaluate if appropriate progress is being made regarding the identified safety targets. As a result, SPIs may be revised or new SPIs created to meet the changing needs of the flight department.
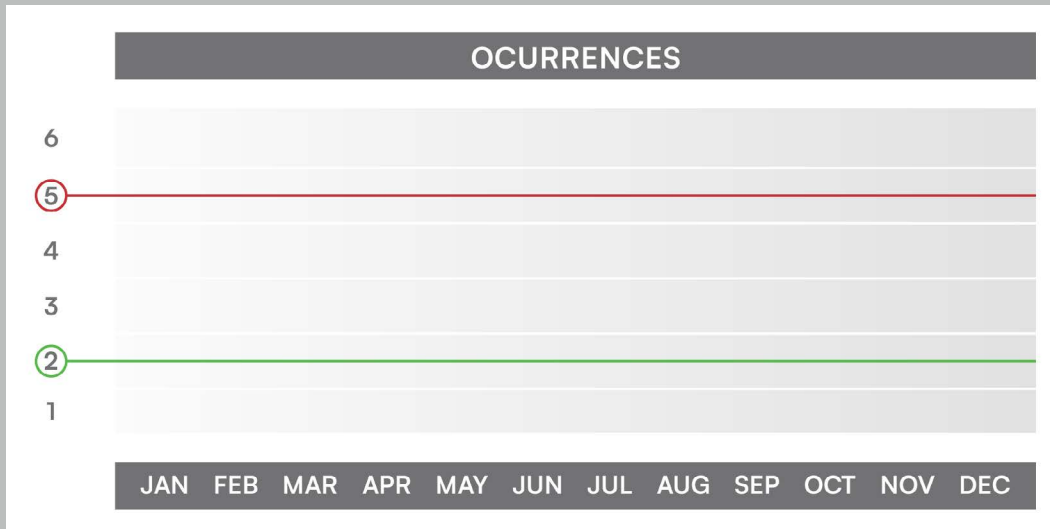
We recommend reviewing your SPIs and Safety Objectives at least annually to ensure they remain relevant to what you are trying to achieve.

With Nimbl, SMS is a piece of cake. Easily submit and implement improvements, spot trends, and make truly informed decisions.
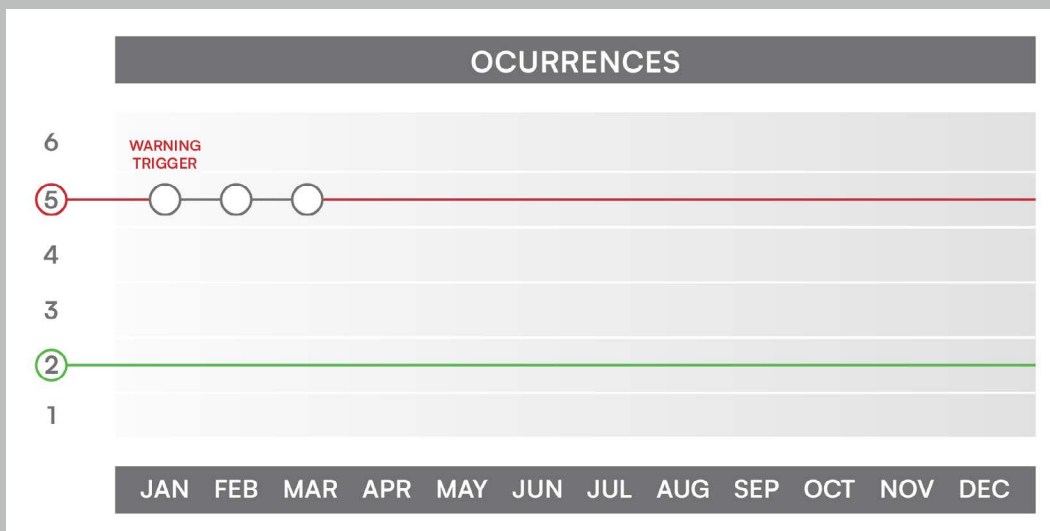
Contact us to learn more.

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SPI Analysis Example

This shows an SPI recording occurrences of a particular event. The target is set at 2 occurrences per month with a trigger of 5 per month.


First, you get your initial three periods of data. You already had January's data, so you record February and March before doing your first analysis.

Looking at January through March, it's clear that this is something that needs to be addressed given each month was at your warning trigger value. You complete a root cause analysis using a fishbone diagram and 5 Why's and identify a potential mitigation.

It is possible that the issue is not in the item you are measuring but instead the values at which the trigger and target are set, but that is more advanced analysis we will cover in future guides.
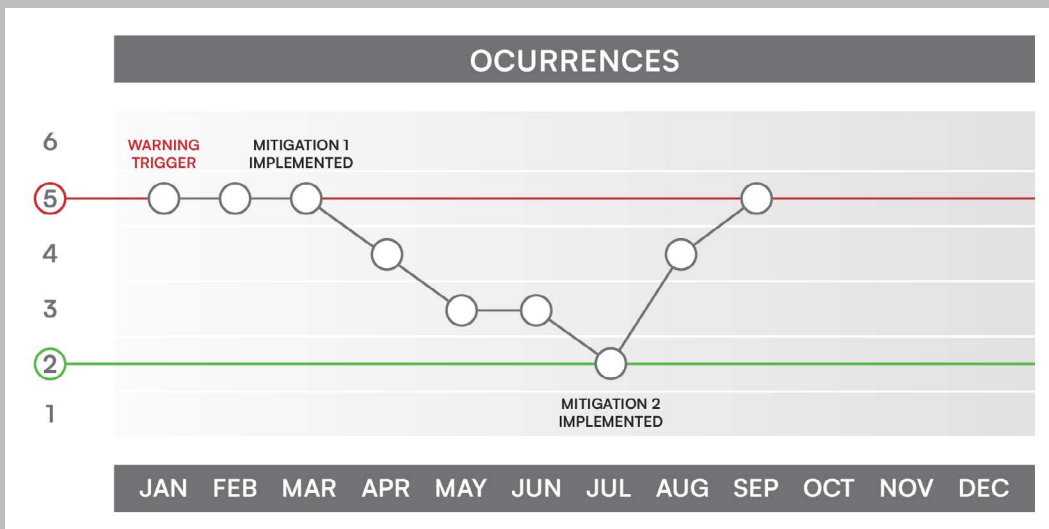
You implement this mitigation and collect data for another four months.
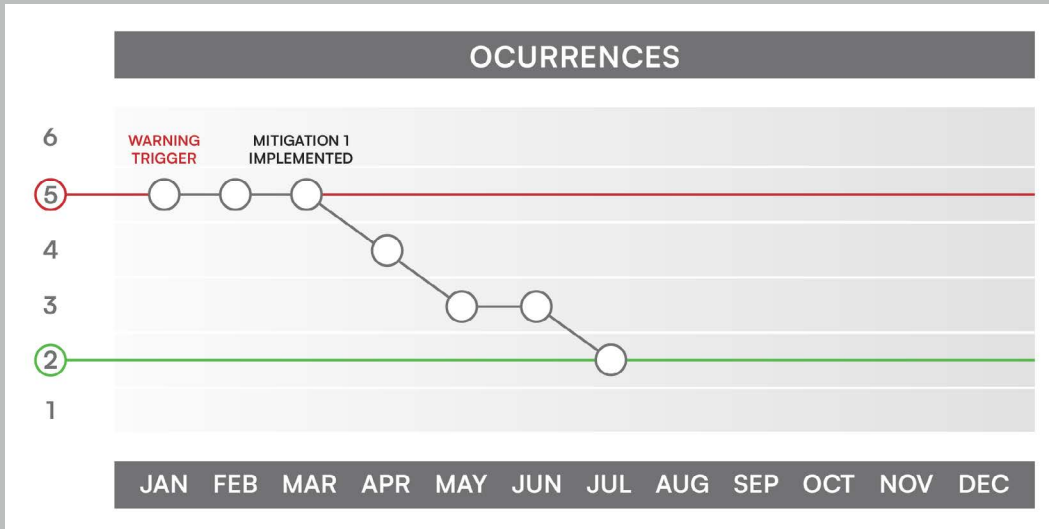
Upon a second review of the SPI data, you notice the trend steadily moving toward your target value. It seems like the mitigation you implemented is having the intended effect.

After receiving feedback from your team about the new mitigation, you decide to modify the mitigation to make it easier for your team to integrate into their day to day operations.

You implement the second revised mitigation and continue collecting data.

In September, your SPI hits the warning trigger value again, so you conduct another data review. Since the implementation of the second mitigation, the data has trended in the wrong direction indicating that it has not had the intended effect and has, in fact, had a negative effect. As a result, you remove the second mitigation and go back to your initial solution.

SPI Analysis Example
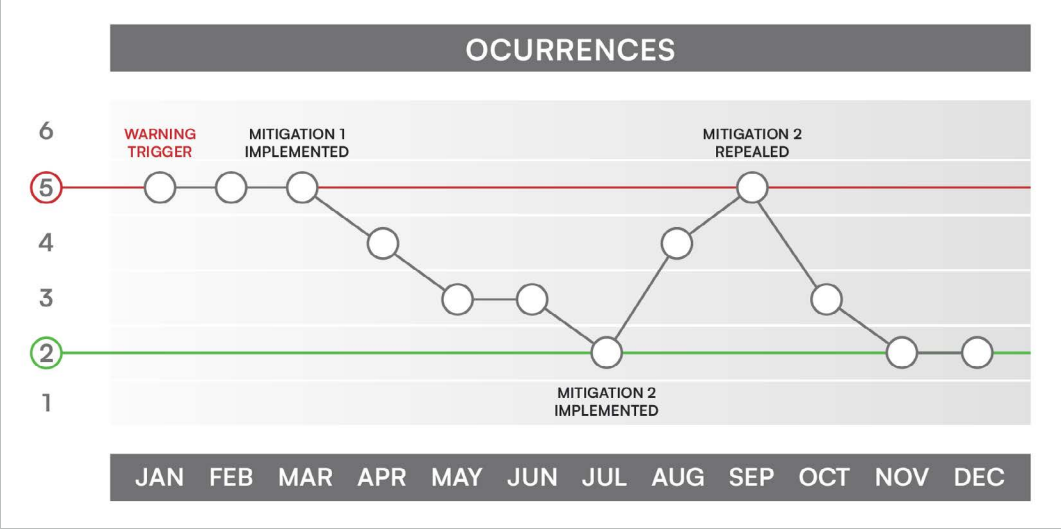
OCURRENCES

You continue collecting data and see that the SPI returns toward your target. Moving forward, you continue to monitor for several more periods to ensure your number of occurrences stabilizes near your target value.

SPIs may seem a little confusing at first, but once you understand them, they are simple tools that have a great impact on your operation. If you find yourself lost among the SMS and SPI world reach out to Nimbl and we will guide you to your destination.

Discover how Nimbl makes it easy to spot trends and drill down into live data to figure out what's going on and where you can improve.

Contact us to learn more.

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