

Peace of Mind: Conquering COVID-19 Return-to-Work with Safety Analysis and Solutions

Small Business Edition



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Outline: Critical Questions, Logic vs. Urgency

We've assembled this guide in response to questions we've received numerous times from small businesses. Knowing that they're faced with the task of planning, creating and executing the means for successfully controlling the spread of coronavirus, in and around their facilities, and with the goal of keeping staff, personnel, associates, visitors, patients, clients, members, students, and customers safe, we've published this in order to provide accurate, trustworthy, and dependable knowledge on the latest approaches and techniques for doing so.

Here are the questions; within the rest of this guide we'll be answering them, one at a time, and in order of urgency:

The COVID-19 Return-to-Work Top-Ten

1. What do we know, i.e. what are the known *safety requirements* necessary to be fulfilled in order to contain the Coronavirus?
 - From the Government/Public Health
 - From others in business, industry and academia
 - Required for, and particularly unique to, our specific business and location, and in particular those for which there are no current solutions
2. What do we do in executing our business, or our mission, or fulfilling our purpose, that currently lends itself to receiving, harboring and/or transmitting the virus?
3. While considering (1) and (2) above we've probably noticed many unfilled holes, i.e. unknown requirements; what/where are they likely to be? How do we know what we don't know?
4. What means, or *solutions*, are currently available to help fill the holes?
 - Do we need to adapt them to our way of doing business?
 - Do we need to change the way we do business (our process) in order to use them?
5. What means are not?
 - Are there solutions that we would like to have that do not yet exist?
 - Can we invent them?
6. How do we keep track of which holes have been filled, and which remain to be?
7. How do we generate a suitable plan for filling them all successfully?
8. What can go wrong?
9. When we think that we've have a plan, begun to fill the holes, and made sure that nothing can go wrong, how are we sure that it will be successful?'
10. How/where do I get help if I need it?

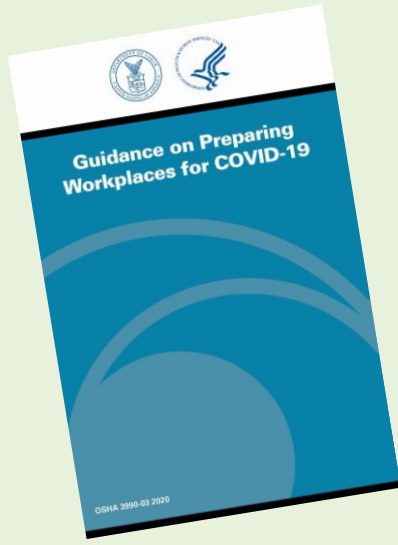
Background

The world has changed, very suddenly. How do we handle it?

For many of you it's asking a lot for you to join the effort to help subdue the coronavirus. Not just medical professionals, or first responders or supply chain specialists in the transportation of groceries -- every retailer, restaurant owner, baker, manufacturer, hair stylist, farmer, and undertaker also needs to put in extra effort for it to be successful as well.

You're probably saying to yourself "I didn't sign up for this when I started this business (or, when I took this job)". "How do I handle something so very foreign to what we normally do around here?"

This guide will help you. It's designed to bring you peace of mind. Always remember this: Safety isn't simply filling out a form, or checking a few boxes. Safety is buried in the details. So, it's very important to understand exactly where things are going well, and where they're not, in detail, before filling out the form or checking the boxes. The very smallest thing, if it's not considered correctly, could hurt someone; and it often does.



OSHA 3990 – Guidance on Preparing Workplaces for COVID-19

We're committed to helping sort out those details, to finding what you're missing, to making sure that you don't overlook anything, to creating your plan for safety, to executing it successfully, to publishing a COVID-19 Preparedness and Response Plan document (using OSHA 3990) if required, and oh yes, to filling out and submitting the required forms.

We've taught many, many people the principles of safety. They've gone on to create a sizable portion of the goods and services you use on a daily basis, each having an outstanding safety record, including many, many cars, many aircraft, and a few consumer products too.

If you find yourself lost mid-way through this guide, or even in the first few pages, DON'T PANIC. We can help.

As an alternative we offer another approach as well--you can also receive this same information via series of on-line webinars designed to lead you through at a more measured pace. Same topics, different approach, same successful end result.

Many people are counting on you to deliver. Make sure they know that you're committed. It will go a long way toward ensuring that they come back; to return

to your business or your organization as things open back up – staff, personnel, associates, visitors, patients, clients, members, students, and customers.

Remove the fear and they will return.

Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less.

--Mm. Dr. Marie Curie



Overview

When confronted with a sudden and unexpected crisis people quickly become overwhelmed. Concern frequently turns to horror when it becomes clear to them that the challenge is likely to be much bigger than they initially thought. For most of us this comes at the point when we suddenly realize that we're in a situation so remote from our past reality that 'we don't even know what we don't know'. This guide is designed to fill the gap in your knowledge base quickly and get you up to speed so that your back-to-work effort can proceed quickly and successfully, but most importantly safely. You'll get an organized approach to make sure that nothing is missed. We'll be sharing with you the methods that Safety Engineers use to ensure success.

There are going to be a few more details than you'd normally be comfortable handling but the safety we all seek is found in those details, so they're quite important. Therefore, we need to track them very closely. We'll show you how to do this successfully.

Finally, as we begin remember this: Safety cannot be bought or owned. It's your job and you can't farm it out to someone else. It must be self-created, fully embraced, and lived out every minute of every day.

These are not normal times. So, more importantly than ever it's time to step up.

Our Approach:

In order make the material in this guide as real, and as immediately helpful, as possible, we thought it would be best to use as many real-world resources as we could find. As part of this effort we pulled them from various levels within government, industry and academia. To ensure consistency and understanding, we'll be using a single case study example, that of a retail dairy operation in the State of Michigan.

We've chosen a business located within Michigan specifically for our example with this in mind, and the following:

- 1. There are broad range of business, industry, academic organizations within it, encompassing a little of everything.*
- 2. Although it was not hit heavily in the first wave of infection its activities in response to the second wave are underway and very much currently in the news.*
- 3. This has given it more time to prepare, hence safety resources are more complete, more up-to-date, and mesh with each other more effectively.*
- 4. Its stay-at-home period has been longer and more restrictive than most.*
- 5. Consequently, the resource situation is more detailed, and more representative of those likely to be seen in all the other states.*

Whether your business or not-for-profit is small, medium sized or large the example we've captured encompasses all the details you'll need to learn how to tackle your effort.

Introduction: Removing the Fear by Applying Structured Problem Solving and Risk Management to COVID-19 Back-To-Work

As we advance toward getting back to work many concerns strike fear in the hearts of those responsible for the safety of the personnel returning to work, and associates and customers / clients / pupils / patients as well. With COVID-19 stay at home orders being lifted too much of what has been proposed by government and public health specialists, or suggested, by media, pundits or experts, is insufficient to calm those fears. This is largely because it's lacking in many, many practical details.

This guide is intended to provide an overview of Safety Analysis and Solutions, particularly for those that have had no need to consider them prior to this crisis. Our goal in presenting it is to remove any fear you have by reducing a complex topic to a set of practical guidelines.

In the current situation with COVID-19 federal and regional governments have imposed a number of generic safety requirements, but have provided no specific details for organizations attempting to implement them. They say "You must do this, this this, and this", without explaining in workable detail how to do them. This leaves most people responsible for implementation, and probably you as well, bewildered as to how to make the required things happen where it counts--in the factory, the restaurant, the warehouse, the school, the farm, the stadium, or the hair salon. While most people have a good understanding of the characteristics of their business or non-profit, its purpose, their facility, their employees, their customers and most importantly their product or service, neither the coronavirus nor Safety principles are their area of expertise.

To make it simple and to the point this is all really about just two things: The ability to think about and understand failures, i.e. things that don't go as planned, before they happen, and the subsequent application of common sense to deal with them.

Safety Analysis and Solutions will fill the gap. No worries – they're easier to learn and use successfully than you might currently think.

The Details, Ranked by Urgency

#1, Urgent Items

I've started, am working on, and still need help with, a plan for reopening operations under COVID-19 Return-to-Work. How can I be sure that it's going to be successful? (Question 9)

First, you're going through an effort to create and execute a plan, often called a COVID-19 Preparedness and Response Plan, for finding and tackling all holes (open issues) that would prevent Return-to-Work, real and potential, each of which would keep you from reopening operations safely and successfully. Having confidence that your plan will work comes from knowing that you've found such holes, and that they are all filled.

Maximum confidence needs a little more:

1.) Make sure that you've hired or retained the very best people -- Given that there are currently very few experts on COVID-19 Return-to-Work more than likely you won't be able to snag one. You'll have to make due with smart people who are unfazed by unanticipated crises for which the solutions are only now being created, and created on the fly. This isn't because it's a safety issue. It's because it sprang upon us so quickly, and because we've been so unprepared. It takes a special person to stay calm in the middle of a crisis. If you're lucky you already have at least one of these kinds of people on staff. If not, find one quickly.

2.) In nearly all safety situations it helps to have an outsider review your work, just to make sure. Having a second set of eyes, from outside, review what you've done makes it easier to find unfilled holes and adds to the confidence. A formal safety expert is not critical but the person should be *independent*, in other words they should not have been involved with your fill-the-holes effort prior to being asked to review what you've come up with. Choose someone who understands business, your business if possible; someone detail-oriented who won't mind digging into the intricacies of your process and your proposed solutions; someone who is good with technical things, and someone you feel has good common sense.

3.) You won't need a full-fledged safety expert early-on, and may not need one at all. Since we can be expensive try to get by without us. There are many resources, like this document, that can teach you what you need to know to be successful. If you have a large operation though, or anticipate that you may need to be prepared for possible litigation at some point if things don't quite go well, then by all means hire an expert to help you fill your holes, or to assess the completeness of your plan and its implementation just before you reopen the doors.

4.) Because safety is in the details, the best safety engineers are people consumed with details. People who have this characteristic are frequently aloof, hard to get along with because they're always right. You do not want a 'yes person' in this role. It's better

to suffer through 'spirited discussions' beforehand than to allow an unsafe process to go into use when you reopen the doors.

Second, this guide delivers recommendations based upon a deep understanding of how to tackle safety issues of all sorts, supplemented with years of experience in doing so. We're laying out for you an approach that is tried-and-true. Yes, a viral pandemic is a unique and never-before-dealt-with experience for most of us, because the last one of this magnitude

What is "Functional" Safety?

Functional Safety is safety captured in instructions -- instructions for operating a machine, directions for assembling a bicycle, instructions for maintaining adequate social distancing. etc..

These instructions can be written in a natural language, like English, Japanese or German, and executed by humans, or captured in the form of software code to be run on a computer.

*It is **safety-in-design- and-execution** as opposed to more traditional safety disciplines which are historically **safety-in-design- and-construction**. Of the two safety-in-design-and-construction is more widely taught, better understood, and more often used.*

But we'll need both. Here we'll concentrate more on safety-in-design- and-execution in this guide because it will be needed most urgently in order to return to work safely, and its importance is not as well understood to general business as yet.

occurred in 1918. But by building on a foundation of successful safety analysis, leading to implementing appropriate safety solutions, we can make certain that the approach you're taking is sound, and can be followed successfully.

There is no existing standardized approach for dealing with safety in COVID-19 Return-to-Work. The need came upon us suddenly with the appearance of the virus, and the response to it, and so does not have the benefit of years of background and experience like other safety critical situations. As a result we've selected a widely used international standard designed for other purposes as the basis for this brand-new effort. This suggested approach is based upon the state-of-the-art in safety engineering. As you'll see shortly the difference between that standard and this situation is minimal, even though what is responsible within it for keeping people safe is very different.

With most formal safety methodologies, a skilled outside expert is required to perform an assessment, which is the final step to ensure that your work has resulted in acceptable safety. However there are currently no formal reviews required by government or industry for COVID-19 Back-to-Work because they're just now developing the methodology for handling them. Just the same it would be wise to have a second set of eyes do a review because we know from other safety fields that it adds greatly to success.

If you see a need to violate one of governments requirements, or industry's norms, because you discovered a better way of making things safe please do so. It's innovation (along with discipline) that will get us through this crisis. Be aware though that if you innovate you'd benefit greatly by securing an expert's concurrence that what you've done is safe and better than previous methods.

In most cases there is no need to hire an expensive consultant to help with your effort. It is however important to make sure that the extra set of eyes we suggest is independent. Often you can offer to be an independent reviewer for another business, in exchange for a member of the that business's team reviewing your work. No money need change hands -- when the budget is tight, as it is now because your operations are currently shut down, this approach represents a bargain.

Everything we've discussed so far has been put forth to ensure that we've reviewed the situation, understood what needed to be put in place, checked everything in detail, instituted it, and are monitoring it carefully in case any changes are necessary. If we've done it correctly and completely it will be sufficient to convince others that we've done the very best we could given the state of the art.

The approach we've highlighted here will help you to get your ducks in a row, ensure that they stay there, and convince others that they will at the same time.

Until a formal standard for COVID-19 Back-to-Work is created this will have to do. We're convinced not only that it's more than capable of handling the task, but will be relatively easy to implement successfully.

What does Functional Safety provide, and require?

Because a pandemic is not a common occurrence there are no existing international standards for creating plans, approaches and solutions that ensure the safety of customers, associates and personnel as they return to work. Thus we turn to those that do exist, looking for direction.

International standards covering functional safety, like ISO 26262 and its fellow industry-specific standards, are all largely derived from generic functional safety standard IEC 61508. As a result they share a common core consisting of:

- *Conducting a Hazard Analysis and Risk Assessment (HARA)*
- *Generation of Safety Goals for the required solution*
- *Elicitation of Safety Requirements*
- *Design of a safety solution to delivery these requirements and ensure that the Safety Goals are never violated.*
- *Evaluation of the relative success of several possible solutions in meeting the requirements when compared to each other, and other alternatives.*
- *Verification that the final chosen solution meets its intended requirements.*
- *Validation to ensure that situation into which the final chosen solution is delivered is covered completely, and successfully addressed, by the solution.*
- *Assessing the solution to confirm that it delivers the intended safety*

In the end you'll need some form of each of these to be successful. For now we'll leave that to the future ...

How/where do I get help if I need it? (Question 10)

Helpful Resources

We'll see here shortly that federal, state and local governments, and industry associations, have offered help in the form of published guidelines and suggestions containing the kinds of safety requirements each of them expects you to meet. These are good resources, but difficult ones to adequately process without some preparation, and perhaps guidance. For this reason let's leave them for a little later. Instead let's start with compiling everything you know about the work done in your business or organization that may be relevant. We'll be looking for holes, safety holes.

After finding the most obvious holes we can then proceed to find the related guidance coming from the published sources -- guidance on how to plug your holes, and guidance potentially on holes you might have overlooked.

Helpful People

Retirees – Because of demographics there are currently a large number of recent retirees coming out of the baby boom generation. Many have free time, and few existing commitments, and are looking for something productive to occupy their time. If you move quickly you'll find technically savvy individuals who like taking on challenges. Don't wait too long or they'll be swept up by someone else.

Youth – Contrary to common popular belief young people do like a challenge. They are in many cases also well equipped, i.e. have enough patience, to master technical things. When it comes to equipment and making it do the job you need it to look for a nearby young person.

Military Experience – Safety requires discipline—just the kind of thing ex-military personnel are known for. These folks are also likely to enjoy the challenge of taking on the cause.

Safety Consultants – We saved these folks for last, for a reason. While you might automatically jump at the opportunity to hire the best help you can find, safety consultants are currently in short supply due to the crisis. For help with your plan, the process of generating it, or its implementation; or if you'd like an assessment consider hiring one if you can find a suitable one available. Remember, there is no current standard for coronavirus safety, thus there are no coronavirus safety experts as yet. This means that any safety consultant should do. To do so is not necessarily inexpensive but is money well spent, delivering peace of mind and preparation in case of litigation.

Get creative. If you need help with disinfection equipment, supplies or processes consider hiring a newly laid-off food service or food processing employee. Along this line your local health department will have generic guidelines for cleanliness, intended for food services and food processing businesses. Start with these even if you're not in the intended industries. The cleanliness part of ensuring that the coronavirus doesn't take hold in your facility comes in large part from the rules for handling food.

If you can't afford hiring or contracting a second set of eyes to check your safety plan consider trading with a non-competitive business that is facing the same kind of challenges you are. You could offer to be the second set of eyes for them; in return they can be for you.

What do we do in executing our business, or our mission, or fulfilling our purpose, that currently lends itself to receiving, harboring and transmitting the virus? (Question 2)

What is it that we do in this business, or organization, that we run?

It is very important when studying the safety of your operations with a eye towards improving them that we understand and document precisely what it is that you do. If we haven't done so thus far there's an easy place to start: What do you teach your new hires after they come in the door and before you turn them loose?

For most businesses many safety-critical details are currently not well captured for the purpose of tackling the current crisis. These need to be generated at the level of your facility or facilities, usually by the people who work within it and have first-hand knowledge in detail. Specifically, of:

- The facility itself, i.e. its layout, including the position of everything inside, rooms, equipment, storage tanks, supplies, etc.
- The customers, associates and personnel who will be within it or visiting it when work resumes.
- The means of getting them, supplies, and finished goods in and out of the facility, as well as through it, e.g. parking lots, doorways, hallways and corridors, etc.
- The nature of the work that will take place there. *
- The interaction that typically takes place between customers, associates and other personnel as that work is conducted.

Of prime importance in all of this is the idea that things, and often people too (we call them customers, clients, patients, etc.), get processed as work is conducted. Raw materials enter a plant and are refined, parts are joined into assemblies, whole chickens are broken down into portions, cars are serviced, and customers come into a shop and are accommodated. Work flows as these things take place. A chain of additional people (employees or associates), usually with machines mixed in among them, each add a little more value to what goes through the flow as they execute their work. Out of the end comes a product or service that ideally meets its needs perfectly.

As we study these work flows we'll be looking for 'pinch points', in particular those places where people tend to bunch up as they come in and out, go from room to room or area to area, take a coffee break or eat lunch, use the restroom, and do the other things that people do.

We'll also be studying how the virus might be carried into our facility, and conversely how we might send it out if our facility is already contaminated.

How do we generate a suitable plan for filling them all successfully? (Question 7)

Typical Flow Behind-the-Counter (Backroom) Operations

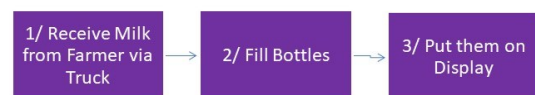


FIGURE 1 -- TYPICAL FLOW, BEHIND-THE-COUNTER (BACKROOM) OPERATIONS

The basis for a good plan is a complete, documented listing of the tasks we perform as we do what we do, in the flow. If customers/clients/patients/pupils/etc. come through the facility we need a flow list capturing how they are processed as well. There are two popular formats for documenting this, one is an outline form called a *sequence list*, the other is called a *flow chart*, which shows each step graphically, connected by arrows showing the direction in which the work flows. Whichever is used there must be enough detail in this, not only to spot those steps which might aid or abet the spread of COVID-19, but also those that already have the potential to stop it. (The way we currently do things we may already unwittingly keep the virus from getting hold, or from spreading.)

Compare these two examples of varying levels of detail, for a retail dairy business, on the employee side of the sales counter:

Flow as typically described (seen graphically in Figure 1, on the previous page):

- 1.) Receive milk from farmer via truck
- 2.) Fill bottles with it
- 3.) Put them on display

vs.

Flow with more detail, more appropriate for safety planning (seen graphically in Figure 2, on the next page):

- A.) Meet truck from farm at loading dock
- B.) Ensure that truck safely moves into position to allow hose to be connected successfully
- C.) Ensure that brakes and/or chocks are applied so truck doesn't move
- D.) Ensure that hose has been properly cleaned
- E.) Ensure that storage tank has been properly cleaned
- F.) Connect hose between truck and storage tank
- G.) Open valve
- H.) Monitor flow level
- I.) Monitor flow temperature
- J.) Monitor tank pressure
- K.) Close valve when either tank is full or truck is empty
- L.) Monitor tank temperature
- M.) Ensure that empty bottles have been cleaned properly
- N.) Load empty bottles into bottling machine
- O.) Yada, yada, yada ...

Keep in mind that if you already have a simple list, more than likely it needs to get more detailed in order to be truly useful here. Why is that? Remember that safety is in the details, because the very smallest thing, if missed, could hurt someone. It's important in every case to get to a level of detail where things can be measured and monitored. Step L above is a good example. We monitor tank temperature, most likely to avoid spoilage, and we can do so by measuring temperature, with a thermometer, and recording it over time. In the original, simple, form of the flow (Figure 1) this might be implied but it is definitely not plainly seen.

To finish this up we will be adding existing steps that have probably never been tracked so closely before because they were not considered to be very important prior to this. What are they? Since people are going to be the primary carriers of COVID-19 in and out of the facility, it will be the movement of people involved at our shop. For the backroom it will be employees. Steps involving them have not needed to be documented previously because we did not have a coronavirus problem. Since we do now these steps must now be documented as well.

Detailed Flow Behind-the-Counter (Backroom) Operations

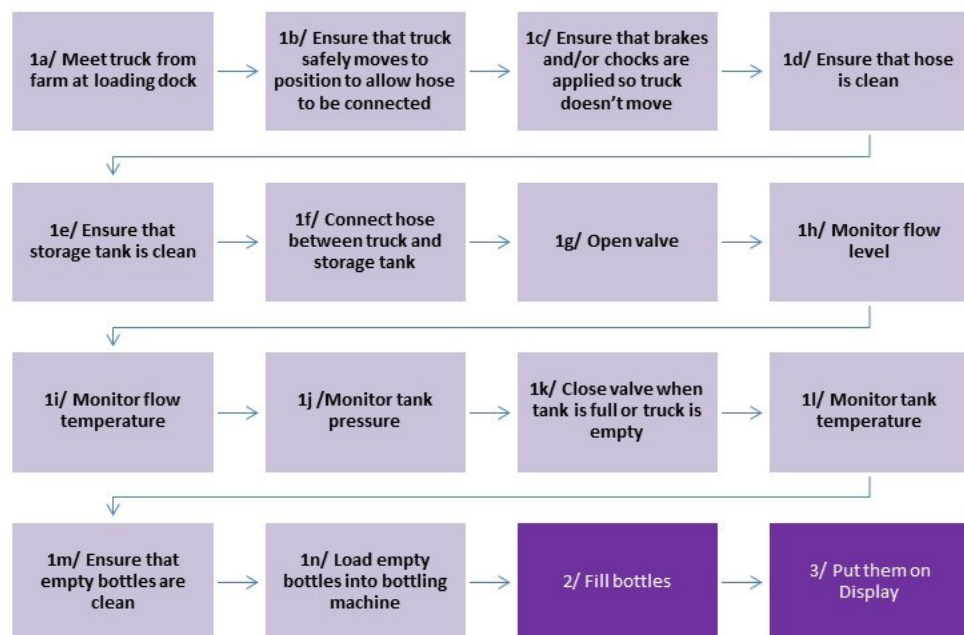


FIGURE 2 – DETAILED FLOW, BEHIND-THE-COUNTER (BACKROOM) OPERATIONS

When capturing both of these getting more detail is better than getting less. The devil is in the details, so the solution must also lie there too. Finally, we must also now add to this steps from the customer side of the counter, also never really needing to be considered previously, because customers entering the facility can be bringing in the virus and passing it on to the employees who execute the backroom process we've just studied.

Why and how do we do it?

In addition to ‘What’ it’s also very important to capture why we do what we do, and closely related to this, how we do it. ‘Why’ helps to explain what we consider important to our success. In organizations that are committed to formal quality control processes and procedures in order to ensure success a complete and detailed set of why’s is critical.

Once again let’s turn to what you teach new hires after they come in the door and before we turn them loose, in order to find these things and document them. Let’s assume you’ve hired a particularly inquisitive new employee. You may find that this person never tires of asking the question ‘Why?’, much like a four year old. You might start with explaining that we begin the day by unlocking the front door. She would say “Why?”. You might answer with “Because our customers can’t enter without the door being unlocked”. And then comes the next “Why?” from her, and you explain “Because we need customers in order to sell our products”. After a few more why’s you get the picture.

Our study of ‘why’ and ‘how’ works the same way as our study of ‘what’. Someone interested in your safety plan needs to know why every requirement listed within it is there, not only to discern its purpose, but to determine whether you are executing it safely, and whether you’ve missed something. The person reviewing your safety plan and its implementation needs to act like a four-year-old in order to do their job successfully.

Fortunately, How’s and Why’s are linked so we only need to use a single tool to record and manage them. In safety while we use the flow chart or its tabular equivalent for capturing and working with the what’s, we use another tool for managing the why’s and how’s: the *requirements tree*. A requirements tree, or requirements hierarchy, displays why’s and how’s, usually vertically, and also captures the relationships between them.

As an example consider once again the dairy shop. Let’s look at a small portion of its requirements tree. The owner of the shop has just explained to her new hire that “we label our bottles with a warning to customers that they must refrigerate them”. The inquisitive new hire responds with the expected “Why?”. The owner replies “Because they must keep our product within a proper temperature range for it to stay fresh and healthy.” Now the next “Why?”, and the answer “Because our customers must never become ill from using our products.”

A graphical representation of this sequence can be seen in Figure 3 on this page. As with the process flow we documented earlier, in the spirit of my previous admonition that it would be very helpful to record more than detail than this applies here as well. In reality a usable requirement tree usually has much more detail and captures many more why’s going up the branches of the tree than this example illustrates.

Now let’s consider the how’s. It turns out that when you’ve captured the why’s you’ve automatically captured the how’s as well. How can this be? We’ve seen that if you visit any box on the tree and look directly upward from it you’ll see the

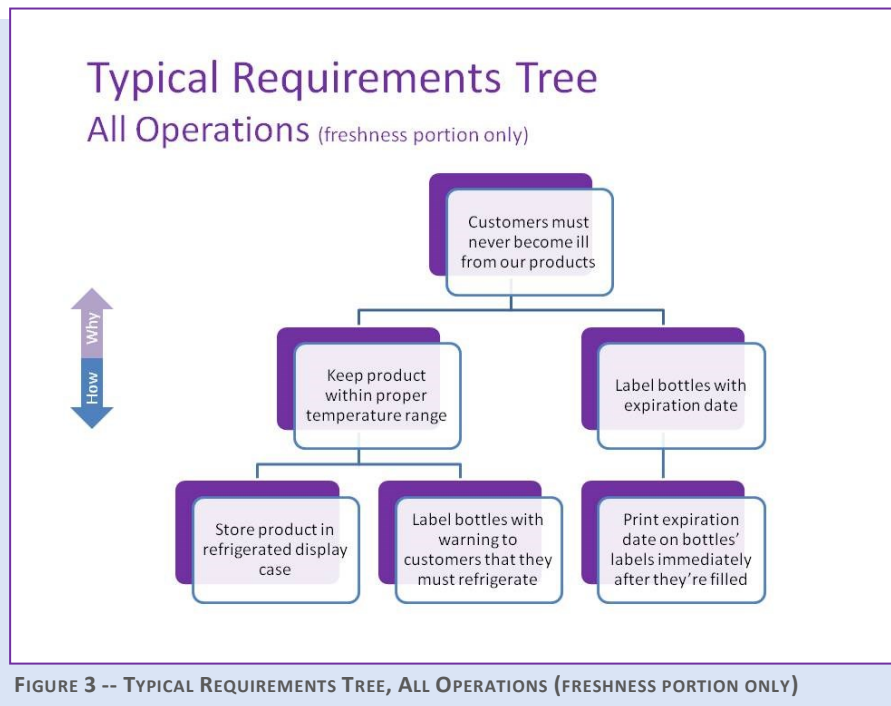


FIGURE 3 -- TYPICAL REQUIREMENTS TREE, ALL OPERATIONS (FRESHNESS PORTION ONLY)

answer to the question “Why?” in the box immediately above it. In a similar fashion if you look downward, you’ll find the answer to the question “How?” immediately below it. Magic!

Before moving on consider this as well: Safety engineers typically call the why’s *requirements*. This is why we call the tool for recording them a requirements tree. In contrast we call the how’s *solutions*. Each solution is the means to deliver the requirement found immediately above it. Notice that for any given level the requirement passed to the next level down below it is considered by that level, at the same time, to be a solution. It’s either, and it’s both at the same time-- depending on who’s looking at it. As a customer my solutions are the requirements that you, a supplier, receive from me.

Hint: If you don’t yet have your process completed, but are just now working on it, you may be thinking of several possible solutions for a requirement. Feel free to temporarily add them all your tree, as alternatives, to help you later with your final analysis of which one to go with in the end.

The requirements tree serves many purposes but among the most important is the concept of *traceability*. Navigating up and down the tree allows you to trace the linkage between the why’s and how’s, but it also serves as a means to document

where they’ve come from. This is particularly important when you have entered requirements into your tree that have been given to you by outsiders.

As an example, let’s consider a requirement dictated by the U.S. Occupational Safety and Health Administration (OSHA) for your kind of workplace. As you fill in your requirement tree this requirement will be entered into it, along with details about its source. Someone studying the tree at a later date, say the local health inspector, will see it and realize from where it came. This is your proof that you’re following all outside mandates (from government, trade associations, your law firm, etc.) as well as the elements of your own design. Your ability to record and display which

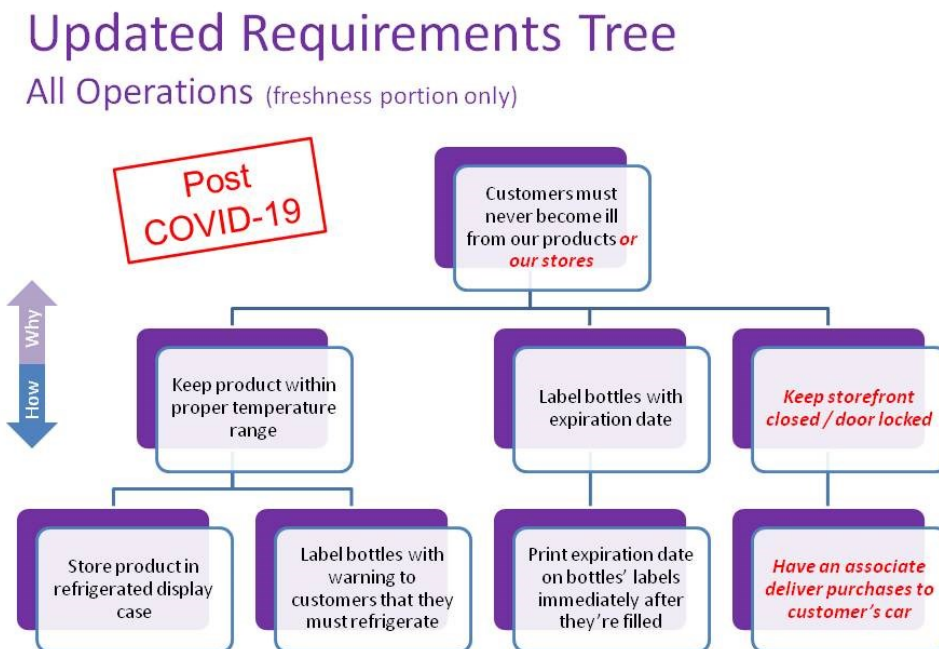


FIGURE 4 -- UPDATE REQUIREMENTS TREE, ALL OPERATIONS (FRESHNESS PORTION ONLY)

requirements are important to the success of your plan *and where they came from*, if not from you, is critical for its acceptance by inspectors and assessors.

So far, we’ve been talking about the upward direction within the tree. Returning to our dairy store example let’s finish it out by going downward instead, seeing how the COVID-19 crisis has impacted it. Since we now recognize that customers entering our store could be a source for contamination, and also be a target for it, we’ve updated our requirements tree, in Figure 3, to include dealing with them. The updated tree can now be seen in Figure 4 on this page. Our top level requirement is now “Customers must never become ill from our products *or our stores*”. When we asked ourselves how to do this most effectively in the short term we came up with a new entry. In the next level below it, down the branch, we now

have a new box “Keep storefront closed / door locked”. The means to do this, the ‘how’, is directly below it and is stated as ‘Have an associate deliver purchases to customer's car’.

With this update we’ve just instituted Curbside Delivery as an interim solution. To make Back-to-Work successful however we’ll need to update the tree again, this time removing this interim means to solve our problem, and replacing it with a more detailed solution that allows us to fully reopen the shop.

Now that we know how to record and manage them let’s look at a few real-world safety requirements, and solutions.

#2, Near-Term Items

What do we know, i.e. what are the known *safety requirements* necessary to be fulfilled in order to contain the Coronavirus? (Question 1)

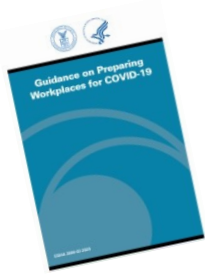



As business owners and operators, we are currently faced with a deluge of documents, websites, and videos, each providing ‘guidance’ for our efforts to reopen. Many of these sources offer redundant information; that is, the same information appears repeatedly across many of them. There are usually a few tidbits here and there however that only appear in one. Therefore, it’s not possible to select just one of them and find everything we need for our business within it. What’s difficult, as a result, is tackling the surplus of information we’re being given and reducing it all down to a small set of safety requirements that we can act on.


Let’s look at some of the documents. We’ve compiled a short list of good ones. Within these can be found everything you will need to know from a high level -- in other words to help you fill out the upper portions of your requirements tree. A few of them also carry information that can help with the middle of your tree. Only one provides low-level information. It is the ‘Calculator’ for estimating the natural decay of the virus that causes COVID-19, from the U.S. Department of Homeland Security.




Why are they level-specific and why are so many focused at the top of my Requirements Tree? Federal, state and local governments are usually not so large that they have staff that is deeply experienced in the hands-on part of most businesses. Therefore, they can’t recommend much about the most specific steps in your process flow. Instead they offer broad guidance, recommendations that can apply to many businesses, not just yours. These suggestions or requirements are at the top because they’re generic in nature.

Some organizations within government may however know a little more about the detailed aspects of your process. Take restaurants or packing plants for example. A prime one is your local health department; and the process flow steps they understand are for food preparation and food processing. If you’re in either of these businesses you’ll have good middle level guidance from them to add to the middle of your requirements tree.

Here are the best sources we've found (as of the date of publication of this guide):

Source	Level	URL	Title	Published by
	Gov't, Federal	https://www.osha.gov/Publications/OSHA3990.pdf	Guidance on Preparing workplaces for COVID-19	U.S. Occupational Safety and Health Administration (OSHA)
		Kinds of Safety Requirements dictated/suggested: <ul style="list-style-type: none"> • Those that are Workplace- and Worksite-Specific • Scope: General and Facility Management 		
	Gov't, Federal	https://www.cdc.gov/coronavirus/2019-ncov/community/guidance-business-response.html	Interim Guidance for Businesses and Employers to Plan and Respond to Coronavirus Disease 2019 (COVID-19)	U.S. Centers for Disease Control and Prevention (CDC)
		Kinds of Safety Requirements dictated/suggested: <ul style="list-style-type: none"> • Those that apply to all Businesses and Organizations • Scope: General and Facility Management 		
	Gov't, Federal	https://www.fda.gov/food/food-safety-during-emergencies/best-practices-retail-food-stores-restaurants-and-food-pick-up-delivery-services-during-covid-19?mc_cid=1bc0fe3462&mc_eid=9858352ee2	Best Practices for Retail Food Stores, Restaurants, and Food Pick-Up/Delivery Services During the COVID-19 Pandemic	U.S. Food and Drug Administration (FDA)
		Kinds of Safety Requirements dictated/suggested: <ul style="list-style-type: none"> • Those that are Workplace- and Worksite-Specific for businesses and organizations handling food • Scope: General and Facility Management 		
	Gov't, Federal	https://www.whitehouse.gov/openingamerica/	Opening Up America Again	The White House, Coronavirus Task Force
		Kinds of Safety Requirements found: <ul style="list-style-type: none"> • Those that are Business- and Organization-Level Specific • Scope: General and Facility Management 		

Source	Level	URL	Title	Published by
	Gov't, Federal	https://www.dhs.gov/science-and-technology/sars-calculator	Calculator: Estimated Natural Decay of SARS-CoV-2 (virus that causes COVID-19)	U.S. Department of Homeland Security (DHS)
<p>Kinds of Safety Requirements found:</p> <ul style="list-style-type: none"> Those that apply to all Businesses and Organizations Scope: General and Facility Management and Safety Personnel Extremely low level: Requirements derive from the effectiveness of disinfectants on COVID-19 elimination, i.e. what kind, what concentration 				
	Gov't, State (Michigan)	https://www.michigan.gov/documents/whitmer/MI_SAFE_STAR_PLAN_689875_7.pdf	MI Safe Start, A Plan to Re-Engage Michigan's Economy	Gov. Gretchen Whitmer, State of Michigan
<p>Kinds of Safety Requirements found:</p> <ul style="list-style-type: none"> Those that are Business- and Organization-Level Specific Scope: General and Facility Management 				
	Gov't, State (Michigan)	https://www.michigan.gov/coronavirus/0,9753,7-406-98189---,00.html	COVID-19 Test Finder	State of Michigan via Castlight: COVID-19 Resource Center
<p>Kinds of Safety Requirements found:</p> <ul style="list-style-type: none"> Currently those that are specific to Businesses and Organizations performing critical functions Expected to open up to all Business and Organizations as testing capacity builds Scope: Management (for business purposes); All (for personal interest) 				
	Gov't, City (Detroit)	https://detroitmi.gov/sites/detroitmi.localhost/files/2020-04/Workplace%20Letter%20with%20Cover%20and%20Signature.pdf?mc_cid=1bc0fe3462&mc_eid=9858352ee2	COVID-19 Safe Workplace Standards	City of Detroit, Chief Public Health Officer
<p>Kinds of Safety Requirements found:</p> <ul style="list-style-type: none"> Those that are City Government-Specific Scope: General and Facility Management and office workers 				

Source	Level	URL	Title	Published by
	Industry, Manufacturer (Lear)	https://lear.com/safeworkplaybook	Safe Work Playbook 2nd Edition	Courtesy: Lear Corporation
	Kinds of Safety Requirements found: <ul style="list-style-type: none"> Those that are Workplace- and Worksite-Specific to Manufacturing Businesses Scope: General and Facility Management and Safety Personnel 			
	Industry, Food Service (McDonald's)	https://www.chicagobusiness.com/restaurants/read-mcds-get-ready-reopen-guidelines-restaurant-operators	Dine In Re-opening Playbook	Courtesy: McDonald's USA
	Kinds of Safety Requirements found: <ul style="list-style-type: none"> Those that are Workplace-Specific for fast-food businesses Scope: Facility Management and shift workers 			
	Industry, Trade Association (IFMA)	https://www.youtube.com/watch?v=dE7wIDKguQ&list=PLMJu8oMyTkW6SeWqSvOi0-Pjph778AP2G&index=6	'Re Entering the Workplace – A Strategic Framework for Facility Managers'	Courtesy: International Facility Management Association (IFMA)
	Kinds of Safety Requirements found: <ul style="list-style-type: none"> Those that apply to all Businesses and Organizations Scope: General and Facility Management 			

Previously known, and required for, and particularly unique to, our specific business and location

Of all sectors of business, industry and not-for-profits, those engaged in food preparation, processing and service have the best advantage as things currently sit. This is because a fundamental part of food handling is cleanliness, and cleanliness is a key enabler to containing the spread of the coronavirus. As a result processes used within their operations already consider and successfully handle a number of issues that the others do not normally deal with.

Considering Questions 1 and 2 there are probably currently many holes, i.e. unknown requirements; what/where are they likely to be? (Question 3)

We've never had to consider the people involved in what we do in the same way before, because the COVID-19 situation is unique in modern history. It's quite likely that each of us who must find holes within our existing processes know very little about this presently. Businesses that process people instead of things, like beauty salons, health clubs, schools, doctor's offices and stadiums have a head start because they should already have a good idea of what the flow of people looks like for them, hence how they process the people who come through. The rest of us need to put on our thinking caps and start thinking.

Here are the most important questions we need answers for:

- A. What are the characteristics of the business, the facilities, and the processes within them that would lend themselves to receiving, harboring and transmitting the virus? Who can bring it in as a carrier? On what surfaces can it live? Can supplies and raw materials we bring in to our facility be contaminated prior to arriving? If they are how do we sterilize them?
- B. What are existing constraints needing to be revisited? What changes do we anticipate?
- C. Will we need to make changes to our equipment and facilities? If so, are they little ones, or big ones?
- D. What do we need to teach our employees to do? Our clients/pupils/visitors? Are they capable of doing what they must do, or is there a significant chance that someone will unintentionally not do what they are supposed to? How do we make sure that they do it successfully, each time and every time?

Some answers to these questions come from the experts on the virus. Others only we know because we're the only ones close enough to the work to observe and understand it.

Safety Engineering is the process of capturing and studying this flow of work, and generating a way in which to make it function safely, each and every time. It's done by generating and successfully executing a plan for ensuring that it never, ever hurts anyone, either as they execute the process, or use the product or service that comes out the end of it.

This plan captures the low-level details that are missing in the directions we've received from outside and above. It is important that, as they are filled in, they must mesh fully with those requirements put forth by authorities and generic experts.

Think of what results is a large 'tree', with many branches, each of which describes how to achieve safety in a greater level of detail. To the implementer this tree is oriented upside-down with its trunk pointed upward. In Safety Analysis we capture safety requirements in such trees, however we call them by the fancy name 'requirements hierarchies'.

Careful management of Safety Requirements is important. It is the most detailed and benefits greatly when persnickety people conduct it. Why is this? The devil is in the details. Once a complete set of safety requirements is in hand it is imperative that every last one be met — missing even the smallest detail means that someone will get hurt, if not immediately then eventually.

What means, or *solutions*, are currently available to help fill the holes? (Question 4)

Mitigation

Mitigation is a fancy safety term for containment and removal, in other words for rendering the hazard (the virus in this case) incapable of hurting anyone. Long term public health officials are counting on a vaccine to be created eventually to induce the humans body to do it's own mitigation. With many viruses nature also handles mitigation, also eventually. A good example is the common flu. It flairs up every winter, and every summer it gets put in its place by the nice weather. The sun's ultraviolet rays, and summer heat and humidity mitigate the flu virus's spread. They may do the same with coronavirus, but we can't yet be sure of it.

Since this crisis began we've heard of, or seen, many innovative ways to protect people from the virus, and to prevent its transmission. In every one seen thus far a great deal of common sense can be found. Don't be afraid to copy these successes, after reviewing them of course to make sure they will work just as well in your situation. Your biggest challenge won't be in finding practical solutions, for in this you'll just need a little common sense, but in making sure that you haven't missed any holes.

The easy part begins once people are at their worksites. For instance, it's relatively easy to disinfect those worksites as the first step before work begins for the day. It's a little harder to keep them disinfected during the work day, especially if there's any traffic to or from their worksite, whether by the person working at that site or by someone visiting it temporarily. It's much harder to handle coming to the site first thing that shift, needing to come and go to retrieve things from storage, to visit the restroom or the cafeteria, or in exiting the facility at the end of the shift. Set up your work flow physically to be smooth and follow a straight line if possible. The more movement outside the ordinary that is necessary the more likely a worker will be exposed to the virus, or at the very least come within six feet of another person or a possibly contaminated surface.

The same is true for processing customers if that is the core of your business.

Your set of solutions will more than likely consist of these items:

1. Components, Supplies and Equipment – Examples include Disinfecting Supplies, Personal Protective Equipment (PPE), Infrastructure Shielding, COVID-19 Test Kits, Traffic Management solutions, Air and Ventilation Management Equipment
2. Techniques – Methodologies for disinfecting, ensuring physical separation, shielding, ensuring adherence to the rules, etc.
3. Recording and Documentation – Planning, Instructing, Monitoring, and Tracking
4. Training – Of personnel, visitors, and if need be, customers

Let's go through each of them in more detail.

Components, Supplies and Equipment

Personal Protective Equipment (PPE)

Personal Protective Equipment (PPE) will be a significant part of your plan, your and set of solutions. It might be in short supply but shortages are being addressed as time goes on. Masks, face shields, and full body jumpsuits are all part of this

category among other things. What you need specifically is often called out in the published resources, but sometimes you're on your own because the people who wrote them probably don't know your business in enough detail to make specific recommendations that you can use. However, common sense is important here. If anyone is likely to be in the path of flying droplets containing the virus they need some sort of personal protection. Likewise if it's possible they can bring the virus into your facility with them having them put on such protection prior to entering ensures that they don't spread it with a sneeze, cough, or other means.

For masks it's important to consider the quality of the mask here. One with so called 'N95 protection' is optimum because it fully filters out the virus, whether incoming to, or outgoing from, the wearer's nose and mouth. All other masks, common or even surgical grade, do not. When selecting an N95 mask take care that it does not have a one-way relief valve in its construction. Such valves make it easier to breathe because the masks containing them only filter in one direction – usually inhaling. With these exhaled air is unfiltered. By wearing this kind you'll be protecting yourself but not others around you.

Because that so much has been published, reported, and broadcast about PPE this will likely be the topic that you will need the least help with.

Physical Barriers (Shielding)

The erection of barriers to prevent transmission of the virus is usually supplementary to the use of PPE. Together with PPE it improves safety incrementally but importantly. This is because normally PPE is the primary means and barriers add an extra margin of safety. If however PPE has failed, or is not being used correctly, either intentionally or unintentionally (say by a non-conformist customer), then shielding forms the primary defense.

Barriers can be very physical, walls for instance. They can also be quite a bit less imposing, and expensive. Clear Acrylic plastic sheet is being used effectively in many situations where customers and retail workers encounter each other. Curtains are being used in automotive assembly plants to ensure separation between assembly lines.

For so many years everything inside facilities has been designed to be open, light and airy as opposed to closed, heavy, dark and stale. We do not need to go back to the old days in order to achieve our goals. Curtains and clear plastic sheets can do just as good a job as thick walls.

What about open-concept offices? The light-and-airy part is still good. The close-in-so-as-to-foster-collaboration part is definitely out. To be fair can a team still collaborate if suddenly curtains or plastic sheeting is inserted between the team members? Yes, but only if it's light and airy. Can they co-locate virtually instead and still be successful? Quite possibly.

Although physical shields are anticipated to be a significant line of defense, only those worn by people (as PPE) are available off-the-shelf, but like disinfecting supplies they are in short supply due to unanticipated demand as well.

Those that are attached to equipment are not yet commonly manufactured items. This means that most will have to be custom-constructed by you, or a supplier, to fit your need.

Air and Ventilation Management

Leveraging moving air is an extremely good way to deal with the virus, if it's suspended in the air and not on a surface. There are believed to be two major forms for transmission of the disease from an infected person, namely sneezing, and talking/yawning. Both are airborne. In both tiny water droplets containing the virus are expelled from the infected person's mouth. Once in the air, unless these droplets are handled correctly they can remain suspended for some time, ready to infect any passerby or wearing a suitable mask. Since

Updating fresh air frequently, especially within enclosed room is important. Heating, Cooling and Ventilation (HVAC) people refer to this as air turnover. Make sure that your HVAC system is providing good air turnover, hence is working for you and not against you.

Disinfection Products and Equipment

A third is by physical contact, i.e. touching an infected surface followed by your face without first sanitizing your hands. Disinfection equipment and supplies are critical to heading off transmission by physical contact.

Disinfection means include, but are not limited to, the following options:

1. Chemicals – Bleach, ammonia, alcohol, etc.
2. Ultraviolet light (UV)—Just like sunlight a portable UV light source delivering a suitable intensity of light will eliminate the virus. Several studies have shown that this sanitizing is accomplished in a matter of minutes and works best if the light can reach all surfaces equally.
3. Ozone—Likewise ozone generators may possibly be considered effective neutralizers. The effect of ozone however has not been as well studied as UV light.

Testing of Individuals

Testing people for the presence of COVID-19 is expected to be one of the most important tools available to ensure that your safety plan is successful. Unfortunately, testing is not readily available as yet, although it is becoming more widespread as time goes on.

There are two types of testing in use and/or under development:

- 1.) Virus Testing
- 2.) Antibodies Testing

Whether you use one or the other, both, or none, is dependent on the solution you enter into your plan for dealing with infected or potentially-infected people coming in, and going out.

The subject of testing is a complicated one. Let's approach it theoretically first, in the spirit that nothing is impossible, which is an important attitude for brainstorming (as we've as we mentioned earlier).

There are two steps in your workflow, and for most organizations other than health-care facilities only these two steps, in which testing is likely to be necessary, and possible: the first being when your employees enter the facility, and the second when they leave. Testing upon entry prevents an infected person from entering and contaminating your facility or the other folks within it.

Testing upon departure provides an indication of whether the person leaving has been infected by your facility or one of the other people within it.

If you're a small operation testing will be hard to come by for some time. Several options exist:

- 1.) Locate a local test lab or hospital that offers testing. (See the 'COVID-19 Test Finder' in the resource listing on Page 19.)
- 2.) If your operation is large enough then consider buying your own test machine in the long run and use one of the other options for the short term.

Traffic Management

People of all kinds, young and the old, understand the meaning of traffic signs, and instinctively know what they are supposed to do when they encounter them.



They can be used very effectively, not only in simple situations, but complex ones as well, to help people understand how to create and maintain safe social distancing.

3.) In between? Consider joining with other organizations nearby to jointly seek test services or perhaps even buy your own test machine.

Numerous testing means are currently available or under development and expected to be available in the near future, so this situation is quite fluid and bears watching closely as it evolves.

What would you do as long as testing remains in short supply?

Techniques

Disinfection Processes

Disinfection to eliminate the possibility of the virus sneaking in on surfaces, packages, tools, carts, components, etc. Many forms of disinfection have already been evaluated and found to be effective, by the CDC for instance. Some have constraints. It is wise to take heed of what these constraints are before committing to using them. Most are widely used already in the food service and processing industries, hence have much experience behind them.

Since the virus can only live for a matter of days on surfaces wholesale disinfection has limited value. If the facility's been shut down for two months with no humans going in or out there will be no virus inside. On the other hand if we've just reopened and our monitoring has determined that a significant number of personnel have just tested positive after being inside then it may have some value.

Traffic Management

Lastly, we mentioned the concept of 'pinch points' earlier. Methods for handling these are believed by most experts to be the keys to success for your entire effort. This is because they are encountered more rarely by most personnel, visitors, and customers than all of the other situations they encounter when interacting with your business. Workers tend to stay at their work site; customers at storefront (unless they are the things being processed); visitors only at carefully controlled locations within the facilities.

Because of this how people move through pinch points needs to be reinforced continuously. We highly recommend a road traffic model approach to managing the flow of people, whether as they come and go from their worksite, or if they are the things being processed through your operation. Most people have learned to drive. The rules for navigating, including road markings, signs, traffic signals, and the rules for following them, are well understood, even by people who don't drive. Children, just by riding in vehicles, have also learned what these rules are.

When you need to regulate the flow of people to ensure that they maintain proper social distancing use traffic metaphors and management techniques to do so. 'Lanes' can keep lines of people separated side-to-side. 'Traffic Lights' can regulate the flow of people into pinch points. Green means clear to enter; red means not yet ready to enter.

Think of a small restroom serving a staff of perhaps 50, one with insufficient space inside for any social distancing, i.e. with less than 6 feet of clearance between all fixtures inside. The only possible way to ensure proper distancing with this arrangement is to allow only one person inside at a time. Where do the rest of them line up if more than one is ready to use it at a time? Outside. In a line marked off on the floor with lane markers, with a string of X's also on the floor, midway those lane markers, at six-foot intervals. And last-but-not-least a traffic signal outside the door, at the front of the line. Green means Ok to enter; red occupied, do not enter.

'Stop' signs, 'Yield' signs, 'Do Not Enter' signs, 'Road Closed' signs, 'Construction Zone' signs; all standard road traffic signage and pavement marking standards can be used to manage the flow of people, instead of vehicles, successfully.

Shielding must work seamlessly with the road markings scheme you create. At many pinch points people traversing through them must also be shielded from potential exposure by the things and people they are passing by.

Contact Tracing

If the coronavirus is detected within your facility, i.e. a hot spot is found, it is imperative that its source be discovered and mitigated so that the same source does not reintroduce the virus back into the facility. It's also important to inform all those who were present in the vicinity of the hot spot that they may have been exposed to the virus, and should thus take appropriate action to be prepared in case they begin to show symptoms of COVID-19, and to avoid infecting others.

Contact tracing generically is the process of tracking down those who were exposed so that they can be informed, and in particular, those who may have brought the virus into the facility, so they can avoid contaminating other facilities, and can prepare for medical treatment should it become needed.

Documentation

A number of different things need to be documented. Documents are a primary means for conveying important information. Word of mouth works quite well for many things, especially in smaller organizations however those that are good at quality control always use documentation as their primary means to convey information.

Most important are instructions. Work instructions for personnel. Directions for traveling through the facility for visitors. With COVID-19 present around us these instructions need to be more detailed, and unambiguous, than ever before.

How do we convey them? In work environments with detailed processes formal work instructions are critical. For visitors many organizations require that they read a pamphlet that describes their role and responsibilities while they are visiting.

For customers we usually rely completely on signage. Creating short and direct instructions and accurately conveying them with signs is most critical. They must be counted on to do the correct thing each and every time with no training. People do not easily process detailed directions off of a sign.

What if anything do I need to document?

Ask yourself who might need convincing that you've done a sufficient job, in fact done the best you can, and that everything's safe? How would you convince them?

First, the authorities, like the local health department. They'd like to make sure that you're prepared to resume operations safely.

Next your customers and employees. They're only going to come back if they feel that it's safe to do so.

Additionally however it might be a jury in a lawsuit situation. It's important not only to convince yourself that you've done a good job, but also these others.

Although it is a lot of work it's important to document as much as possible, in detail and as best you can, in order to be prepared to answer questions and to provide a convincing argument that you've successfully implemented safety, in order to help calm fears if nothing else.

Related Note: Lawmakers are currently debating whether some level of immunity from litigation under this unprecedented effort is in order, i.e. whether a good-faith effort is sufficient to avoid being sued if something goes wrong. Until this situation is resolved be prepared for anything.

We recommend that you consult and stay in touch with your organization's attorney for the latest advice on this situation.

Also very important is the need to be consistent in implementation. First consistent in language and approach. Just as importantly consistent in enforcement when the occasional non-conformist feels the need to overlook one of the rules.

Discipline

Safety requires discipline. As much as people often complain about automation, and now the concept of automated cars and driving, computers are much more disciplined than people. Software can only do what it was programmed to do. Until machines can really think (not too far off?) they cannot make mistakes. They can be programmed incorrectly, in other words not prepared for the situation they find themselves in, but they will still do what they were told to do, consistently, every time and without fail.

People, unfortunately, are not so consistent, largely because they can think and have the freedom to do what they please. We must always be aware of, and plan to handle, cases where people don't follow their training, posted signs, and yes, common sense.

Training

Training in this context means formal training for staff; informal training, handouts or detailed postings for visitors; and posted instructions (signage) for customers, unless your operation processes customers and has a very complex process, or you manufacture products to be used by your customers for COVID-19 control or abatement.

At the beginning for the most critical of them we advocate stationing a 'facilitator' at each pinch point to help remind, gently, the people passing through it of their responsibilities.

What do we need to invent? (Question 5)

If you can't seem to find a solution to a particularly important problem don't be afraid to dream one up. Safety is an on-going process. What isn't available, or possible, today may readily be available in six months. The pandemic is highlighting the need for significant innovation. Solutions that don't currently exist will find their way into use (if you prefer to make) and/or production (if you'd rather buy), especially if there is a large market for them. The same pressure being applied to quickly develop and release a safe and effective vaccine is also coming to bear on safety equipment and PPE.

For this reason safety engineers don't rule out any possibility. Your end result needs to be an organized and interactive set of safety solutions working together to deliver safe handling of COVID-19 within your facility in order to protect your personnel, your customers, and visitors. You are responsible for choosing this set, and integrating the pieces so that they deliver.

We suggest that you proceed with your research and planning as though anything is possible, and in fact pretend temporarily that it's already available. By including those solutions that would be nice to have, even if they don't yet exist, you're preparing yourself for the point in the future when they will, and assembling a wish list for suppliers. You can thus proceed with implementing the present and preparing for the future at the same time -- evaluating all possible solutions, whether currently employable or not yet possible.

Because safety is non-stop it's wise to have a plan to revisit your plan on a regular basis, and update it, and your deployed solutions, as new solutions appear. This is the essence of 'sneaking up' on problems.

More than likely you will need to deploy something temporary, and fairly expensively, just to get back to work; and then replace it at some time in the near future with a less costly, more efficient, and more permanent solution.

However, you can't afford to wait indefinitely for these new technologies to become viable. The most important business decision you need to make involves how much money you need to sacrifice in the short term so that you can make it to the point where these lower cost technologies can be instituted in order and allow you to lower your costs.

Automatic Air Blasts? Let's consider a hypothetical, but completely plausible, example. Suppose it's been determined that jets of fast-moving air are effective in dispersing the virus so that it is essentially no longer suspended in the still air that employees will walk through on their way to the cafeteria.

Think of an air compressor feeding a nozzle that will blow a high-speed stream of air automatically in front of any person who is traversing the area across their anticipated path to lunch. This could be an effective way to clear a safe way through a potentially contaminated area.

If it would be nice to have, but doesn't yet exist, you could:

- 1.) Make one
- 2.) Find someone to make it for you
- 3.) Wait for industry to invent it and put it on the market; then you can buy it

There are practical challenges with all of these. For instance, if you run a restaurant you're not currently in the machinery-building business. As a result, it could be a very big distraction to you to make it yourself, by diverting you from your passion.

However, since it doesn't exist yet and you need some sort of solution you'll have to find an alternative to implement immediately. Once that's in place you can resume searching, and perhaps prototyping the air blast in your spare time.

The important point is that all possible solutions, imminent or future, should be on your radar screen at all times. For this reason, remember to include the future in your plans immediately.

#3, Longer-Term Items

How do we keep track of which holes have been filled, and which remain open? (Question 6)

We've presented and proposed, and hopefully you're planning to use, or perhaps already have used, two important tools for organizing the details associated with the safety necessary to protect your personnel, associates, visitors and customers.

Peace of mind comes from feeling confident that you've found all the holes, and that they are all filled. In order to get there it helps to be able to stand back, look at everything you've proposed and done, and spot any holes that you've missed. This is why many safety experts prefer the graphical version of each of the tools used to capture, and answer the questions 'What?', 'Why?' and 'How?'. They'll often print out both the work flow and the set of safety requirements in tree form, in a large format (perhaps 22" x 34"); stick them to a wall; stand back a few feet (maybe 6?); and study it for holes.

Questions begin to come to mind. Have we thought of everything? Are there any branches missing in the requirements tree? Is the set of safety goals we've captured complete? Do we have a solution for every need? Are all of our solutions viable? Is something we already do a solution we need in another area of the process? When we sanitize the countertops using the process that we've employed over the last 5 years is this sufficient to meet the new safety requirements for COVID-19 mitigation dictated by the county health department?

It's always very difficult at any point in the process to answer the question "How do we know what we still don't know?", but this graphical, large-map approach makes it a quite a bit easier. That's why we suggest it.

Another tool for organizing your work is the *open issues list*. You'll need someplace to log the holes and your efforts to plug them. This is the place. Keep a list. For each entry in the list include the date the hole was discovered, and a description of what it is and how it is proposed to be plugged. Also record all subsequent progress on filling each of them, each with a new entry. This list is your roadmap for the tasks necessary to complete the job of filling all the holes.

It's also a good idea to schedule and hold regular safety reviews. These consist largely of running through the open issues list to confirm that steady progress is being made. If it's not raise the roof.

Finally, be aware that because safety is in the details the smallest detail could be a show-stopper. It is VERY important that anyone with a concern over safety be heard, that their concern be recorded, studied, and assessed, and that they not be harassed because of their finding issue. Anyone should be able to initiate a stop-work order for your workflow if they feel something is not safe. You are responsible for creating a culture that considers safety important and rewards, rather than penalizes, the finding of new holes that you didn't spot in your planning, or that suddenly appeared after you went live.

What can go wrong? (Question 8)

One shortcoming seen frequently is a missing safety goal or one or more safety requirements, often resulting from overlooking something. This is why it's so important to be able to review your plan from a high level. When we're finished we will have captured many, many low-level details. If we only look at them, and not where they came from at the same time, we're likely to miss a high-level requirement or goal, i.e. an entire branch of the tree. Because this can happen, and in fact would be expected to happen with COVID-19 since no one has done this kind of work before, it's critical that we use approaches like using large printouts for our reviews, and that a second set of eyes be invited in to review it as well.

Seen less often is a problem due to an unanticipated failure. When computers are overseeing safety they can fail. People don't normally fail in the same way, but they can be forgetful. It's very important to evaluate beforehand what happens if machines fail, and likewise if people forget an important step, misread their instructions, receive insufficient training, or aren't thinking straight because they aren't feeling well.

What's encouraging to us in the safety business who use the tools and methods we've described here, and have followed the emergence of COVID-19 Return-to-Work, is that we see very few things can go wrong, as long you're sufficiently prepared. We've created this guide to make sure that you are.

Conclusions and Wrap-Up

As we said at the beginning it's asking a lot for you to help tackle the coronavirus mitigation effort, because it's so foreign to what you normally do. Thus our goal here has been to help you understand the significance of, and the underlying analysis for safety, which you will need in order to do this, and thus to reopen successfully.

Before reading this guide when you looked at all the instructions, recommendations, and mandates flying at you from all directions it was certainly true that they did not, and unfortunately still do not, provide precise requirements for you to follow and implement, only generic ones. Consequently it will take effort to sort through them, to determine which of them apply to your situation, and to make them specific to the needs of your business or organization. Using the background information we've described for you in this guide, and the tools and methods we've presented, you'll now be able to say "I now know what I don't know".

Moreover, we hope that it gives you the confidence to find that you're ready to learn what you don't know, and to move on. Move on to tackle your safety plan and the actual work you need to do, quickly and successfully. Move on to publishing a COVID-19 Preparedness and Response Plan in the process if it's required. Move on to make your facility safe and ready to reopen. Move on to opening your doors once again.

It bears repeating that many people are counting on you to deliver. Make sure that they know that you're committed. Your work on your safety plan, and its implementation, will go a long way toward ensuring that you can reopen safely, that you can convince the authorities that you've done your very best to make it happen, and that your staff, personnel, associates, visitors, patients, clients, members, students, and customers know that it's indeed safe for them to come back to your business.

Remove the fear and they will return.

Good Luck and Stay Safe!

What does a COVID-19 Preparedness and Response Plan (consistent with the recommendations in OSHA 3990) need to contain in order to be acceptable?

In the sidebar on Page 5 entitled 'What does Functional Safety provide, and require?' we gave you a few important hints about where to start. Good formal planning requires each of the steps we've listed there, and in the end the data that they provide is the true evidence that you are safe to reopen.

Because it's only a summary OSHA 3990 does not give you a detailed explanation for these steps, but it does refer to them in passing, and they are covered more thoroughly in other OSHA publications. For instance our first step 'Conducting a Hazard Analysis and Risk Assessment (HARA)' is mentioned briefly in 3990, on page 22, '... the results of the employer's hazard assessment ...' but no definition of what this means is provided there.

For your COVID-19 Preparedness and Response Plan to be successful you'll need to review OSHA's separately-published requirements for all of the steps and incorporate them into your planning. You must have them to prove safety.

Conclusion: *When your plan is published the requirement is usually taken to mean that you only need to provide a summary of it, without including your details in their entirety.*

But don't be tempted to skip your detailed planning behind it as a result. To be truly successful you'll need to have your detailed plan, with all the steps listed and formalized in place-- then you can simply generate the required summary from it.

Safety in Products, Services, and the Workplace

Keeping staff, personnel, associates, visitors, patients, clients, members, students, and customers safe, and satisfied, in a dynamic and rapidly changing world



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