

COVID-19: The Role of the Risk Management Process and Its Impact on Pandemics

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Bruce Lyon, CSP, PE, SMS, ARM, CHMM

Vice President, Hays Companies

- 38 years of experience assisting clients in risk assessment, team-based problem solving, safety management systems, ergonomics and OSHA compliance
- Chair of TC262 US Technical Advisory Group to ISO 31000, member of ANSI Z590.3 Prevention through Design committee, Advisory Board Chair to the University of Central Missouri Safety Sciences program, and a director for the Board of Certified Safety Professionals
- Co-author of “Risk Management Tools for Safety Professionals” (ASSP), and “Risk Assessment: A Practical Guide for Assessing Operational Risk” (John Wiley & Sons)
- Authored numerous articles in Professional Safety, three of which received 1st place for Technical Writing Excellence by ASSP and is a frequent speaker at national and regional conferences. In 2018, he received the CSP Award of Excellence from BCSP.
- Professional member of ASSP, past president of the Heart of America Chapter, a member of the Risk Management practice, and Ergonomics practice

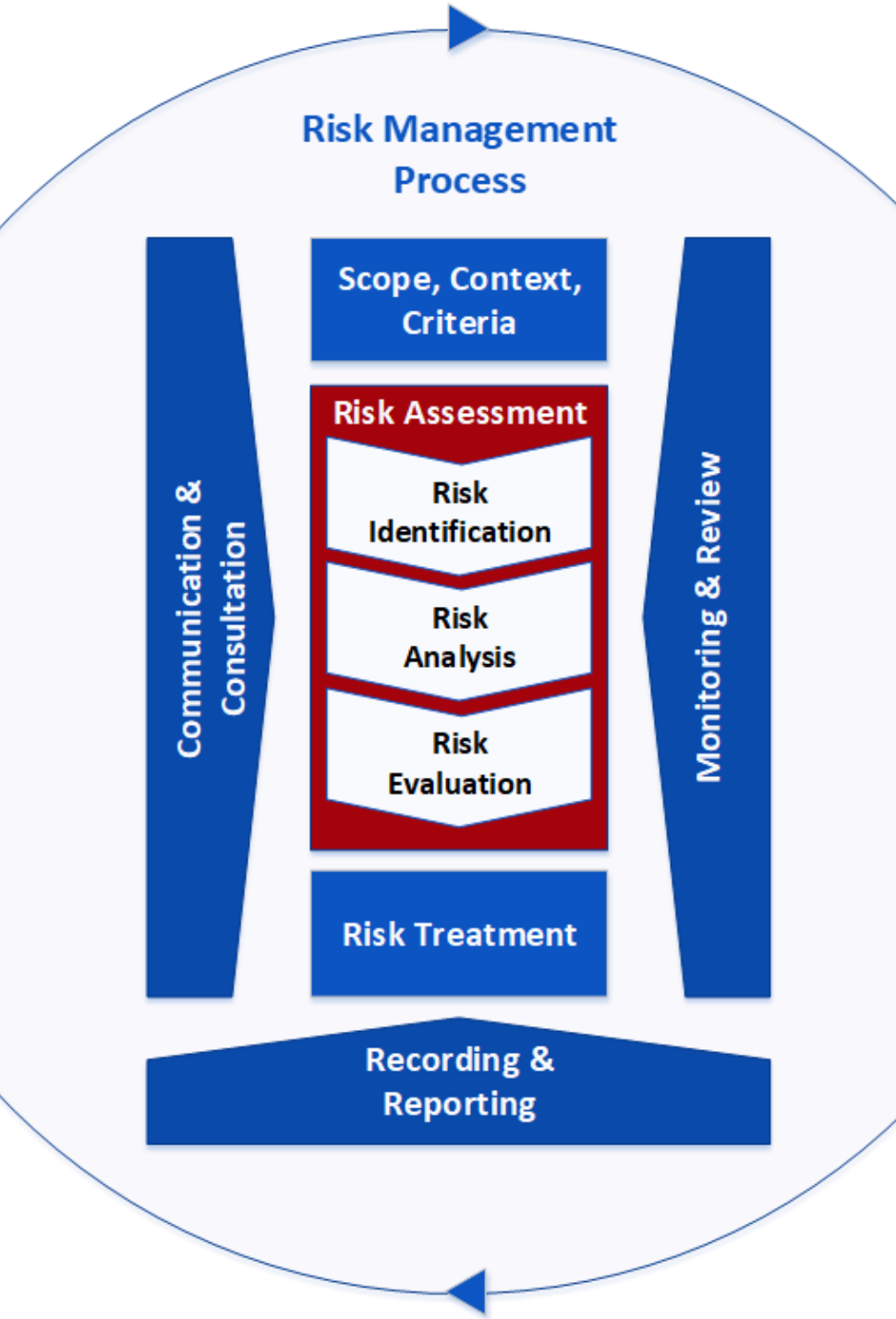


Georgi Popov, PhD, CSP, QEP, SMS, ARM, CMC, FAIHA

Professor, Geoscience, Physics and Safety (GPS) Sciences University of Central Missouri

- Dr. Popov teaches undergraduate and graduate courses in occupational risk.
- He holds a PhD from the National Scientific Board, M.S. in Nuclear Physics from Defense University in Bulgaria, and a post-graduate certification in Environmental Air Quality. In 2001, he graduated from the CGSC in Ft. Leavenworth, Kansas.
- Popov is a member of ASSP's Heart of America Chapter, recipient of the chapter's 2015 Safety Professional of the Year (SPY) award and 2016 ASSP Region V SPY award.
- He is co-author of "Risk Assessment: A Practical Guide for Assessing Operational Risk" published by Wiley, and "Risk Management Tools for Safety Professionals" published by ASSP.
- In 2017, Popov received ASSP's Outstanding Safety Educator award.





Risk

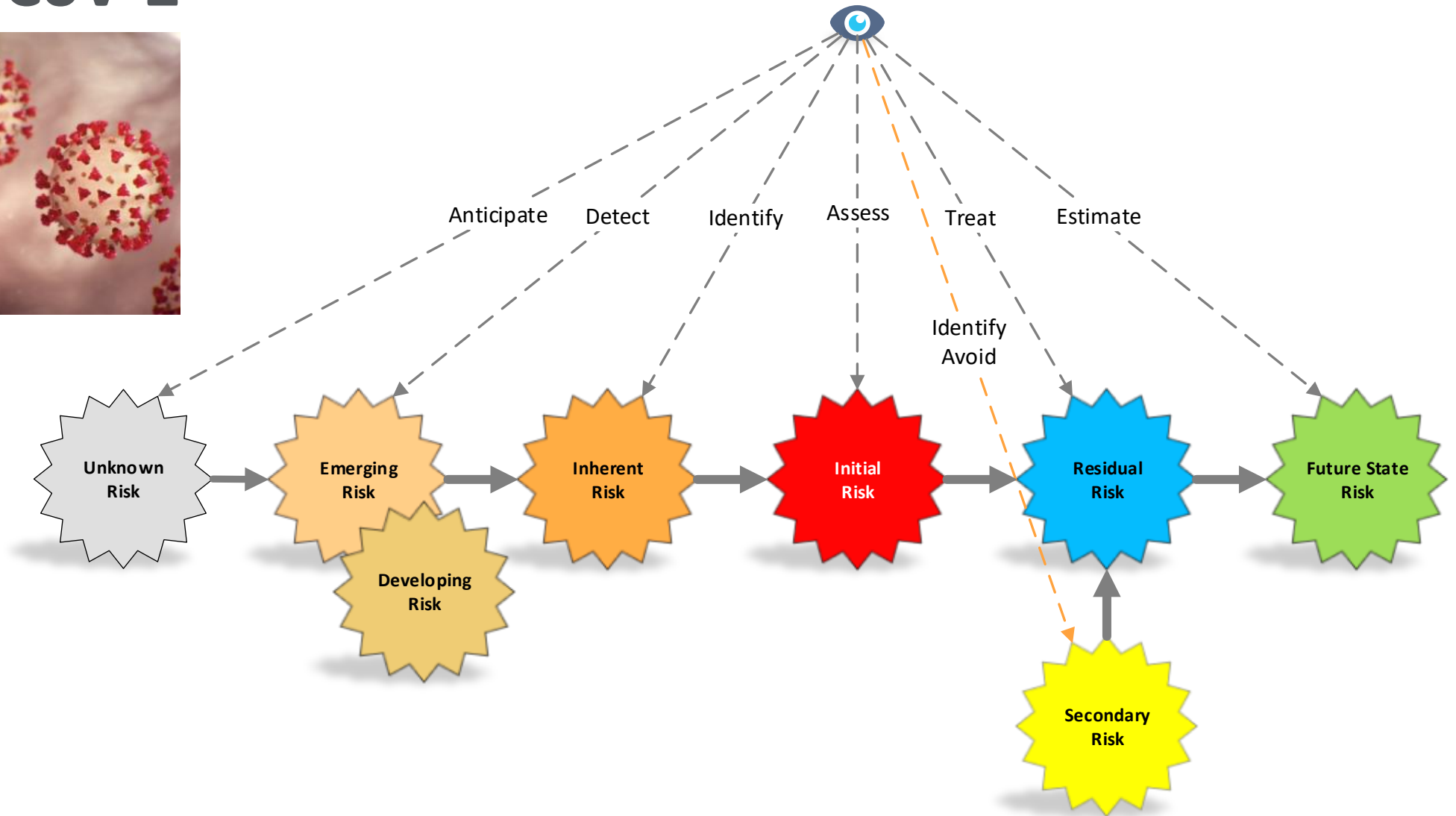
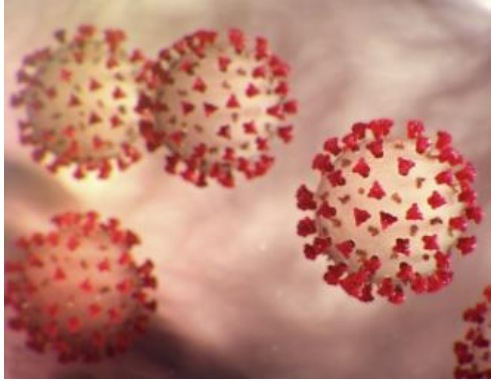
- Risk - 'the effect of uncertainty on objectives' (ANSI/ASSP/ISO 31000)
- The Risk Management Process
- "Although the contemporary crisis is loaded with bad news, this has not been its primary problem. It's the 'unknown. Give me bad news any day over complete uncertainty.'" (Jim Paulsen, The Leuthold Group)



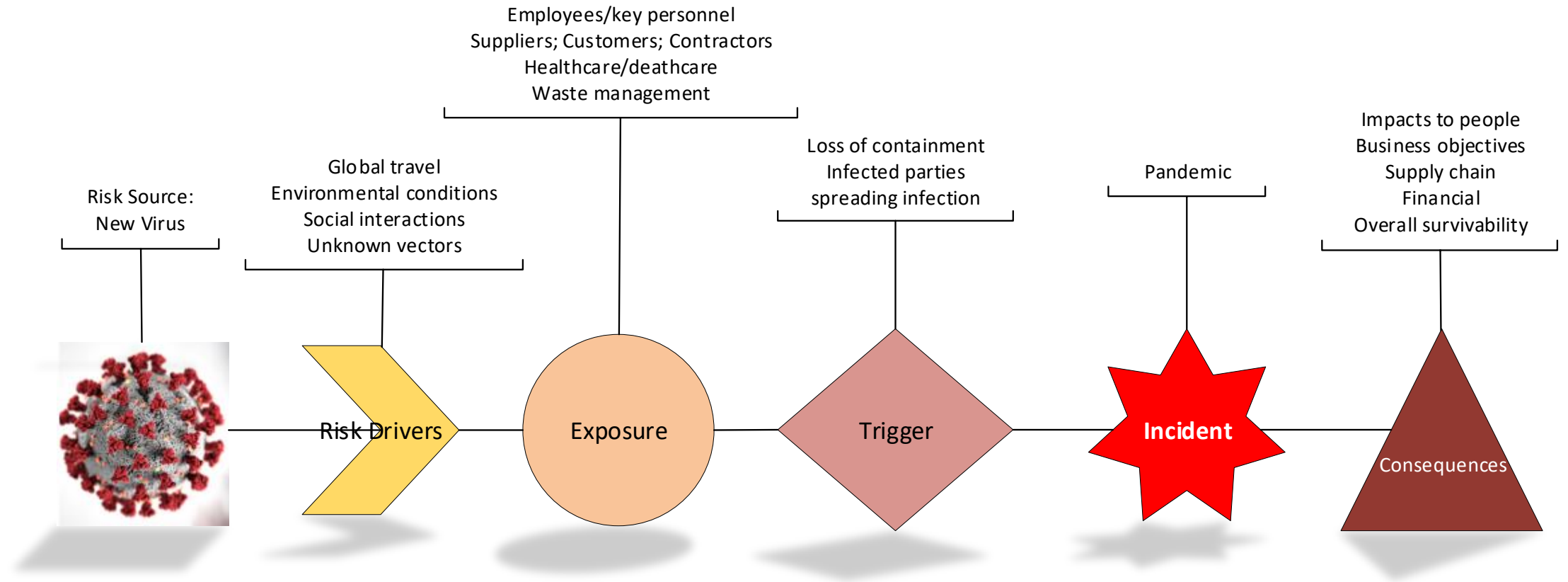
Uncertainty

- Uncertainty surrounding the pandemic has led to:
 - Global Business Interruption
 - Healthcare system overloading
 - The Economy
 - Supply shortages
 - Cyber threats to remote work
 - Psychological stress, isolation
 - Job security, family health concerns
 - Public fears, rumors and change
 - Uncertainty about the future

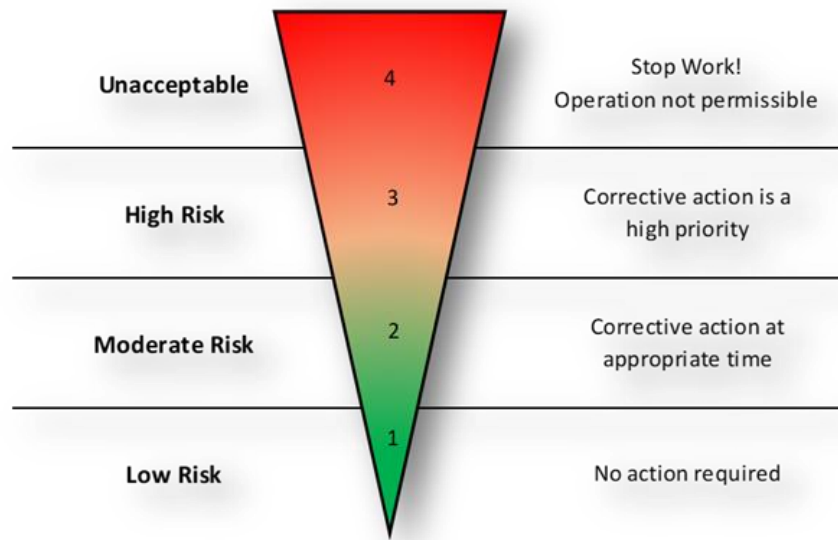
SARS-CoV-2



Risk Pathway



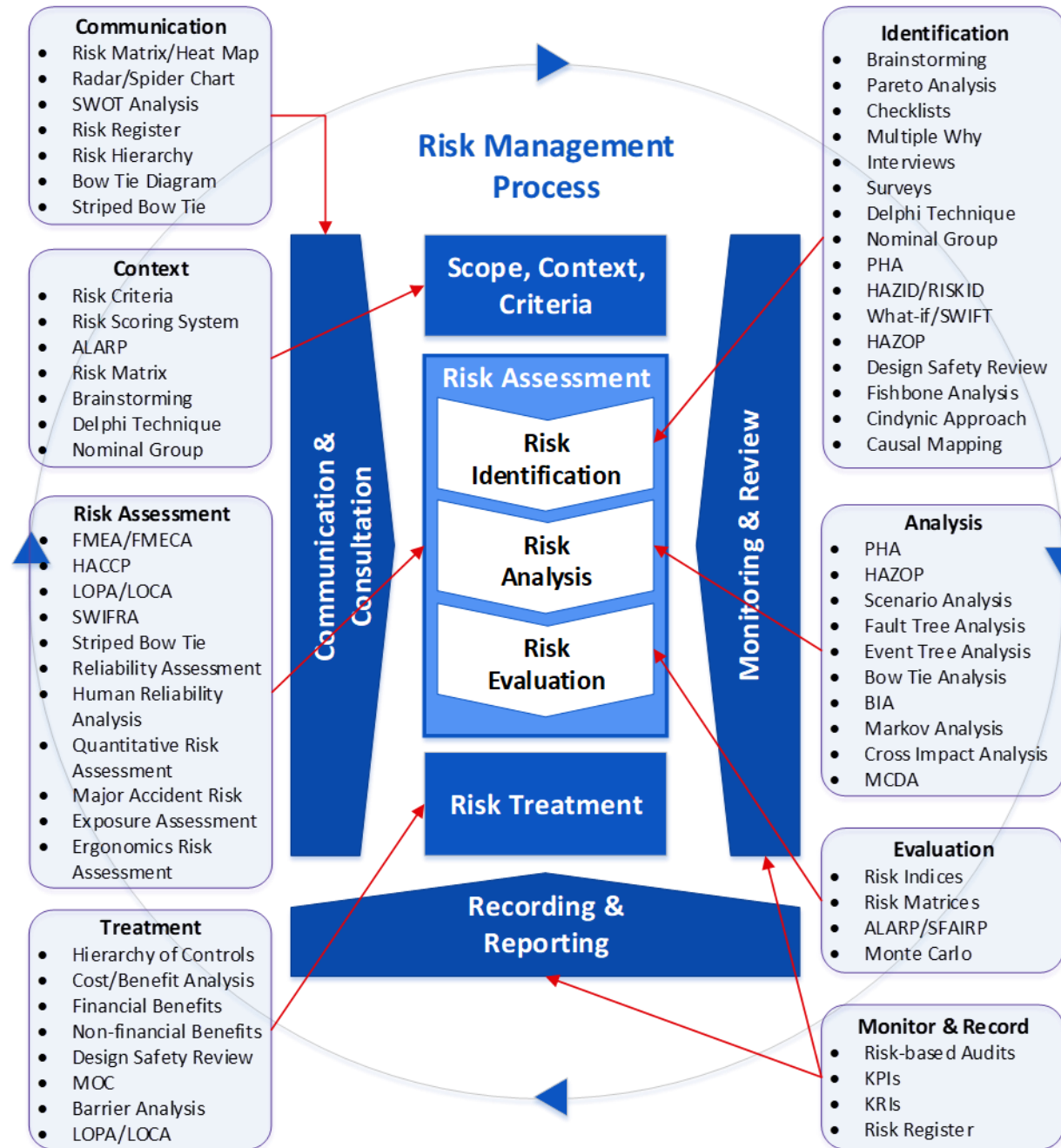
Establish Risk Criteria and Context



Incident Outcomes				Likelihood of Occurrence				
Severity Rating	Health Effects (People)	Property Damage	Environmental Impact	1	2	3	4	5
				Very Unlikely	Unlikely	Possible	Likely	Very Likely
5	Death or permanent total disability	Catastrophic damage	Significant impact	5	10	15	20	25
4	Permanent partial disability; hospitalizations of three or more people	Severe damage	Significant but reversible impact	4	8	12	16	20
3	Injury or occupational illness resulting in one or more days away from work	Significant damage	Moderate reversible impact	3	6	9	12	15
2	Injury or occupational illness not resulting in lost work days	Moderate damage	Minimal impact	2	4	6	8	10
1	First aid only; no injuries or illnesses	Light damage	No impact	1	2	3	4	5

Very high risk = 15 or greater; High risk = 9 to 14; Moderate risk = 5 to 8; Low risk = 1 to 4

Select RA & RM Tools



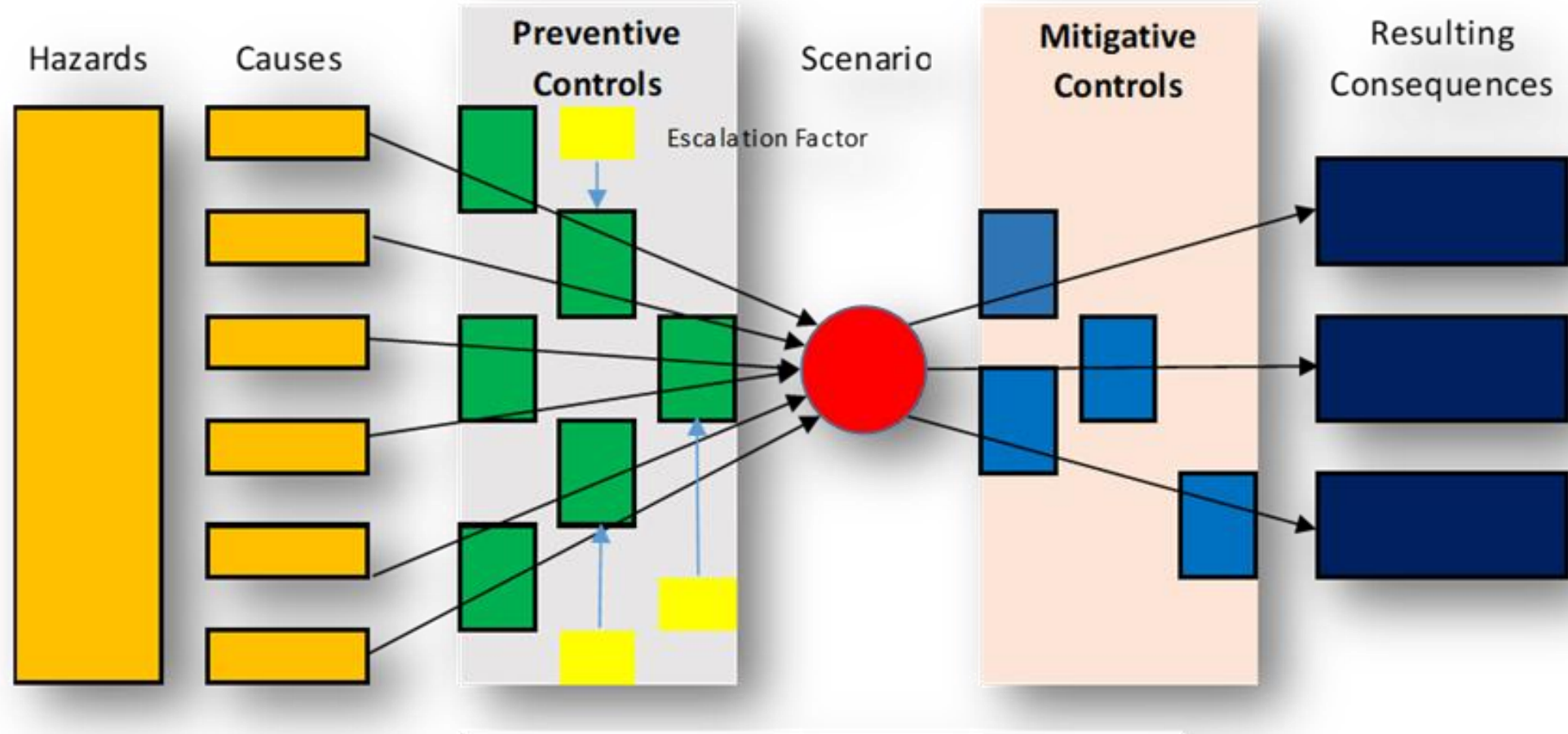
Assess Threats - 'What-if'?

Structured What-if Risk Assessment (SWIFRA)													
#	What If?	How?	Why?	Current Controls	L	S	Risk Level	Risk Level Acceptable (Y/N)	Additional Controls	L 2	S 2	Risk Level 2	% RR
	...we outsource 1/2 of our production to Asia? Answer: We'll save \$\$\$.	We can hire 2 operators for the same salary.	We want to diversify our supply chain	1 shift operation in our Midwest facility									
1	...the operator is exposed to SARS CoV? Answer: Probable death or severe illness	Traveled to Asia to train operators there	Diversify production and save \$\$\$	Training and Good Hygiene practices	1	5	5	Y	Temperature check upon return.	1	5	5	0%
2	...the operator COVID 19 is undetected? Answer: Possible multiple exposures	median incubation period for COVID-19 is just over 5 days	We need our experienced operator to improve productivity	Procedural training	1	5	5	Y	Temperature check every day.	1	5	5	0%
3	...multiple operators become ill due to SARS CoV2 exposure? Answer: Possible multiple fatalities and illnesses, business interruption	our RM was not aware that median incubation period for COVID-19 is just over 5 days	Emerging risk!	None (Inherent risk)	3	5	15	N	Bleach disinfection every day	2	5	10	33%

Are Layers of Protection Adequate?

Event	Cause	Consequences	Current Layers of Protection (LOP)		Current State (CS) - Existing LOP RL			Combined Consequences	Combined Risks			RR
			1	2	Severity	Likelihood	Risk Level	Top Event	S	L	Risk Sum	CS C
Potential SARS-CoV2	SARS-CoV2 exposed operator	Workers exposure.	Admin (Clean w/Bleach)		5	2	10	Multiple Operators Exposed				
Low RH=11%	HVAC not properly operating	Minor respiratory irritation	None		2	1	2		5	3	15	13.5
Chlorine exposure	Cleaning w/Bleach	Minor respiratory irritation	None		3	1	3					

Communicate Risk

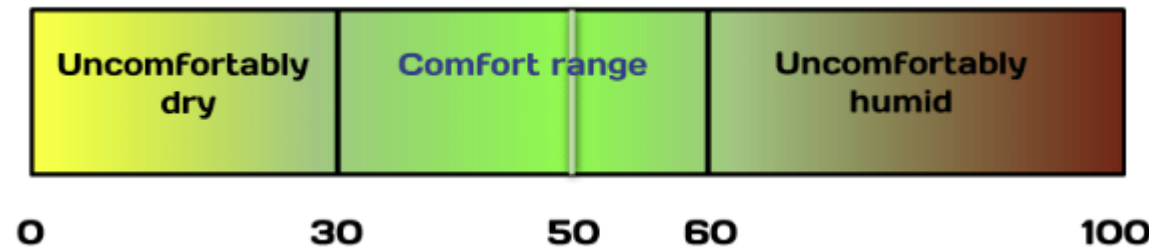


Emphasize Risk Summation

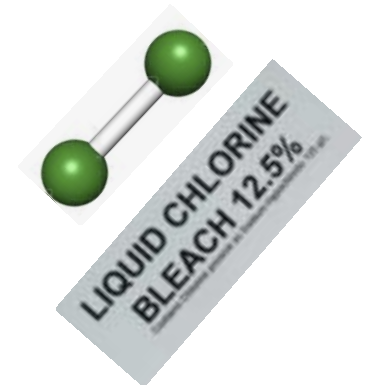
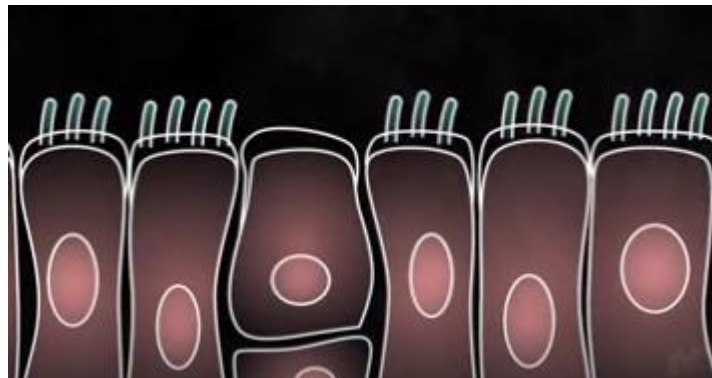
Severity Rating	Incident Outcomes	Property Damage	Environmental Impact	Likelihood of Occurrence				
				1 Very Unlikely	2 Unlikely	3 Possible	4 Likely	5 Very Likely
5	Death or permanent total disability	Catastrophic damage	Significant impact	5	10	15	20	25
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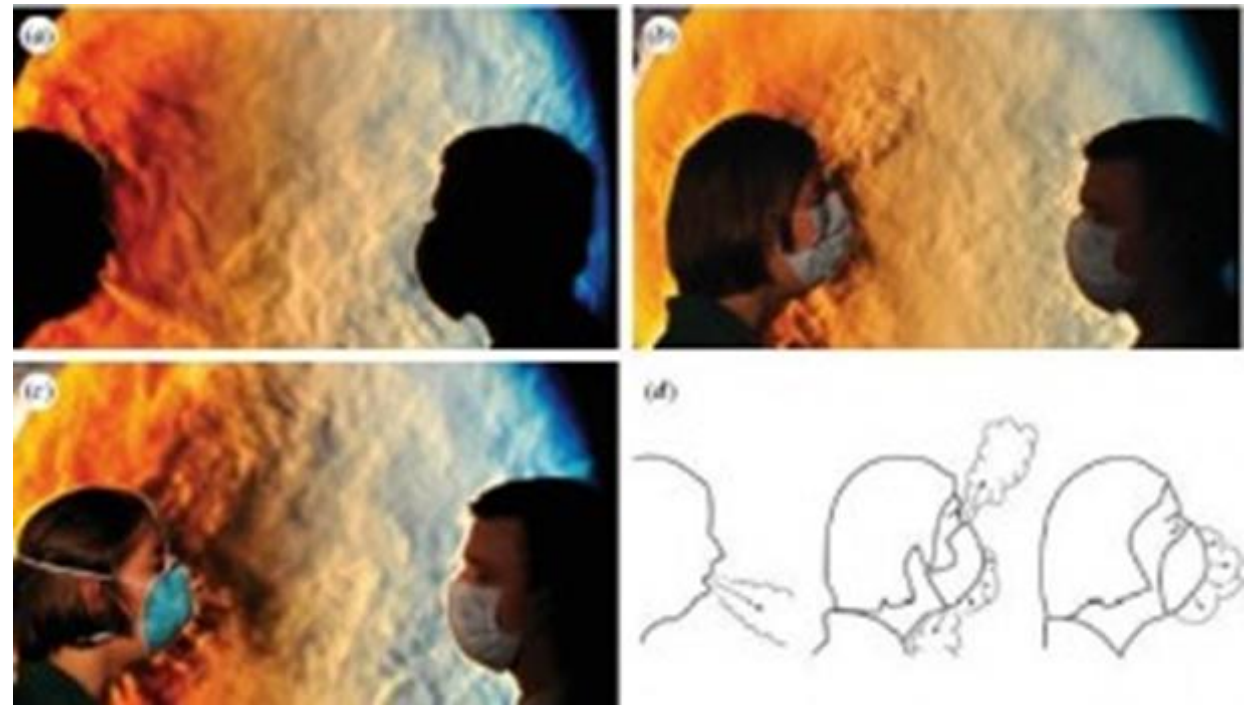
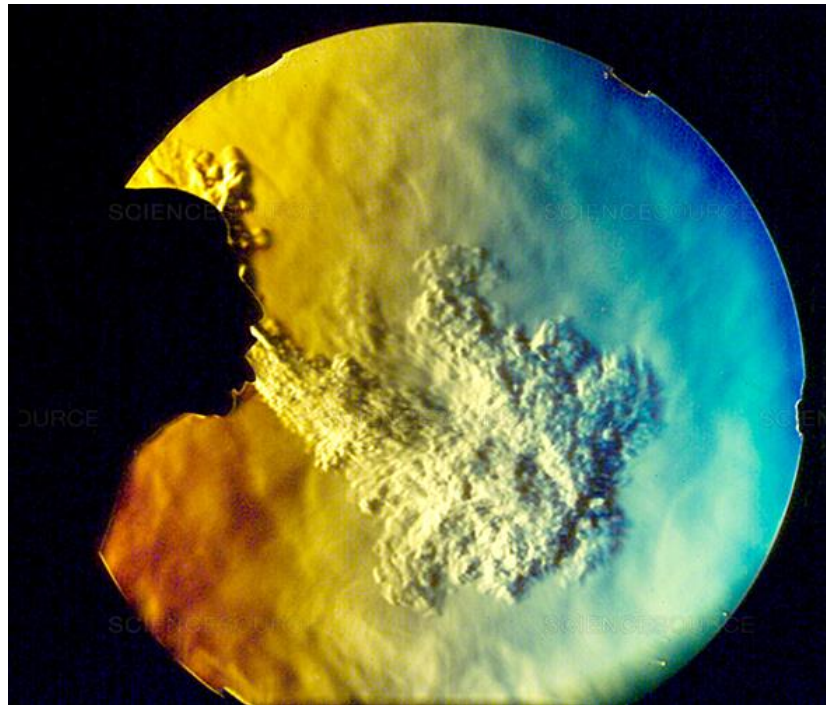
- SARS-CoV2 S=5; L=2: RL **10**. We apply Admin. Controls – cleaning every day.
- RH = 11% - **low humidity** can dry out the mucus that normally coats your nose and airways - making it easier to get infected



- Chlorine also affects the respiratory system – weaker defenses



Transmission



Credit: Gary S. Settles/Science Source



Human skin vs. Stainless Steel –
Surfactant

Persistence of Coronaviruses on Surfaces

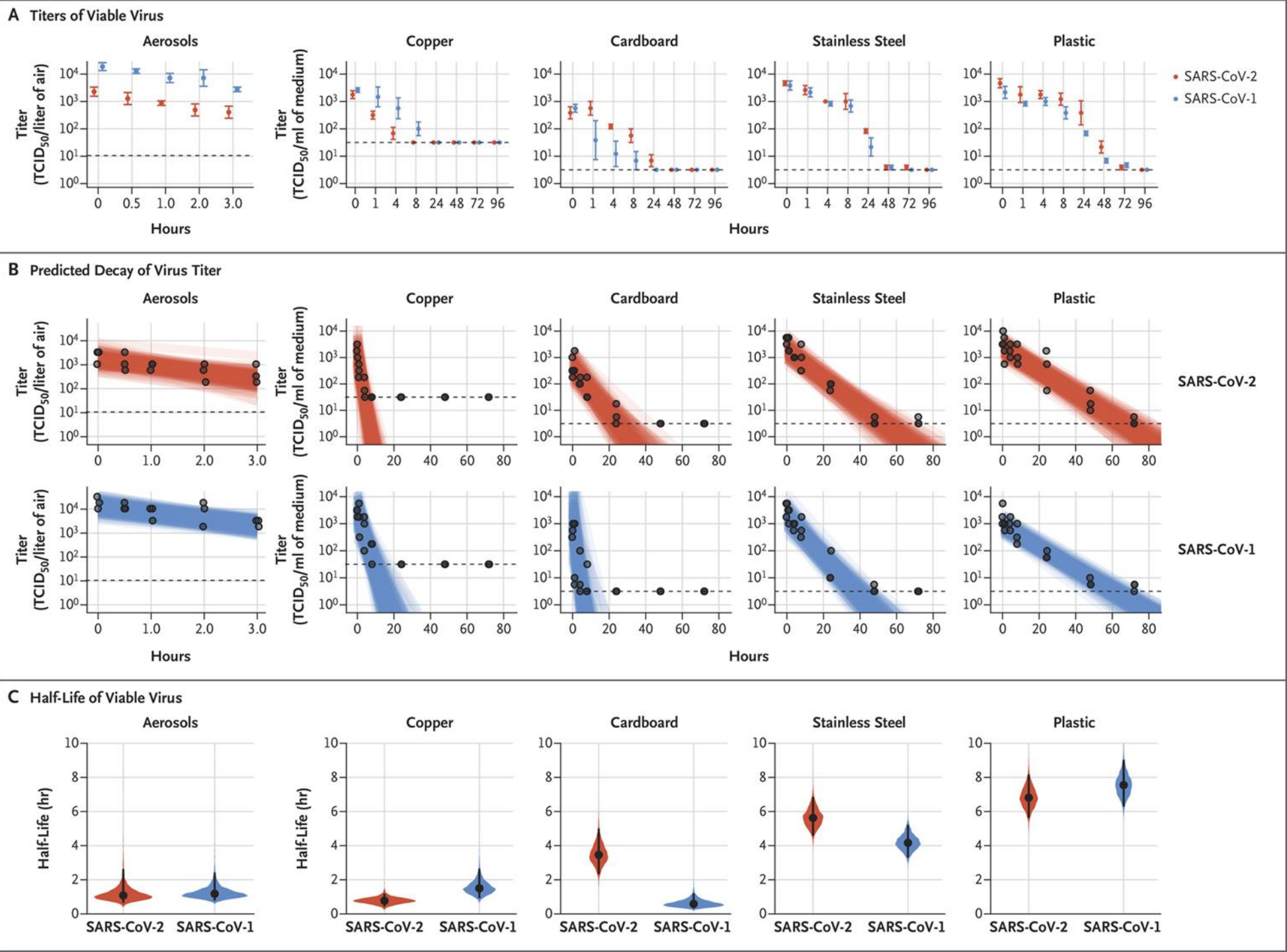


Source: *J. Hosp. Infect.* DOI: <https://doi.org/10.1016/j.jhin.2020.01.022>

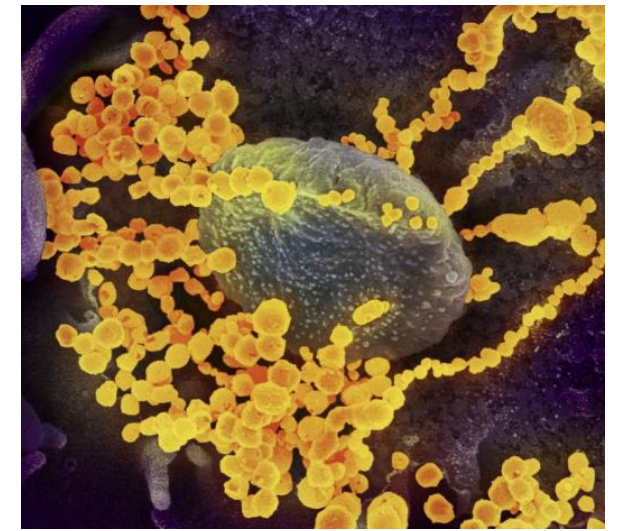
Note: Coronavirus activity may be impacted by temperatures higher than 86°F (30°C). Authors also confirm that coronavirus may be effectively wiped away by household disinfectant. COVID-19 was NOT included in this study

Medscape

Viability of SARS-CoV-1 and SARS-CoV-2 in Aerosols and on Various Surfaces.



Size Matters - Fine droplets



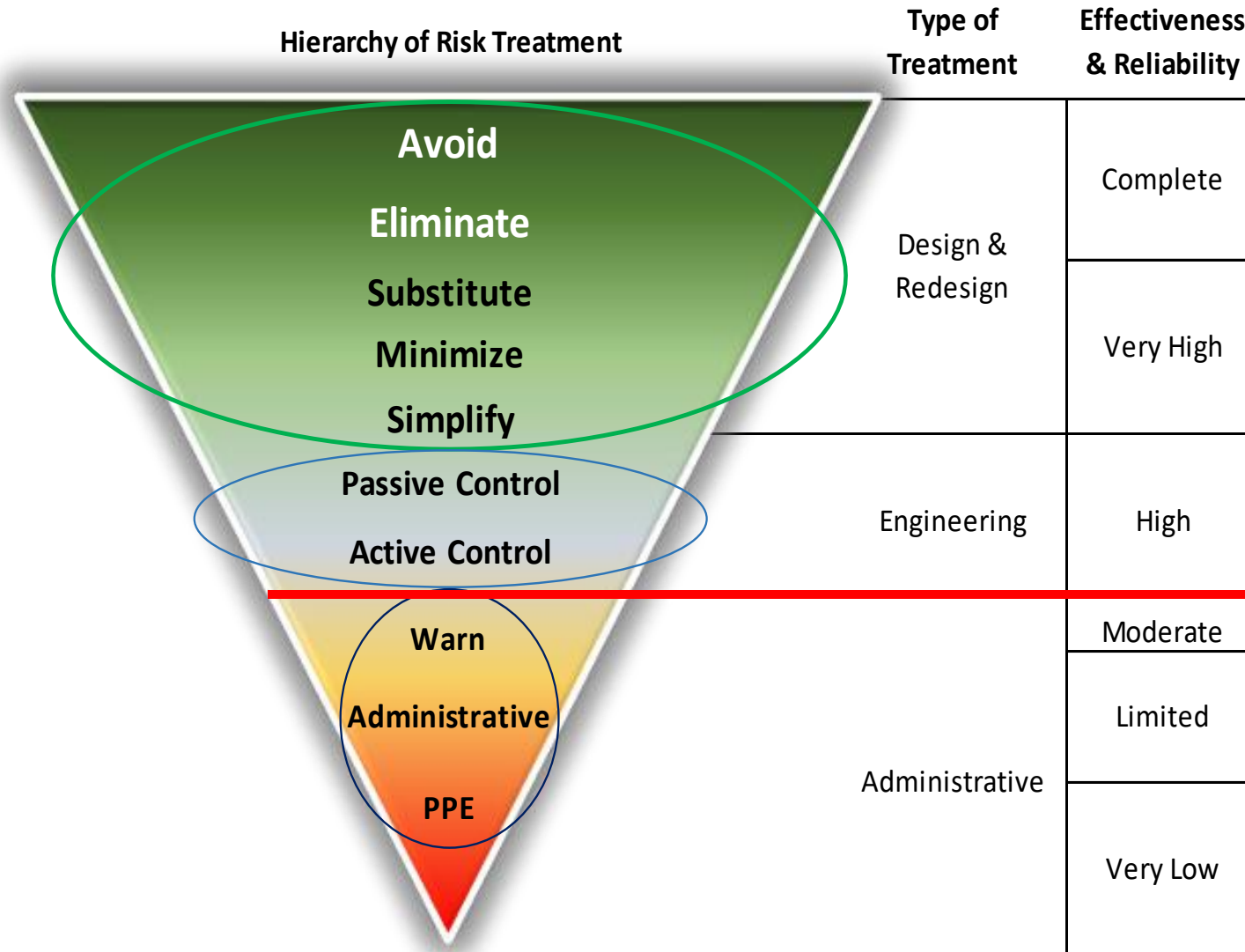
MERV Rating – Filter Efficiency

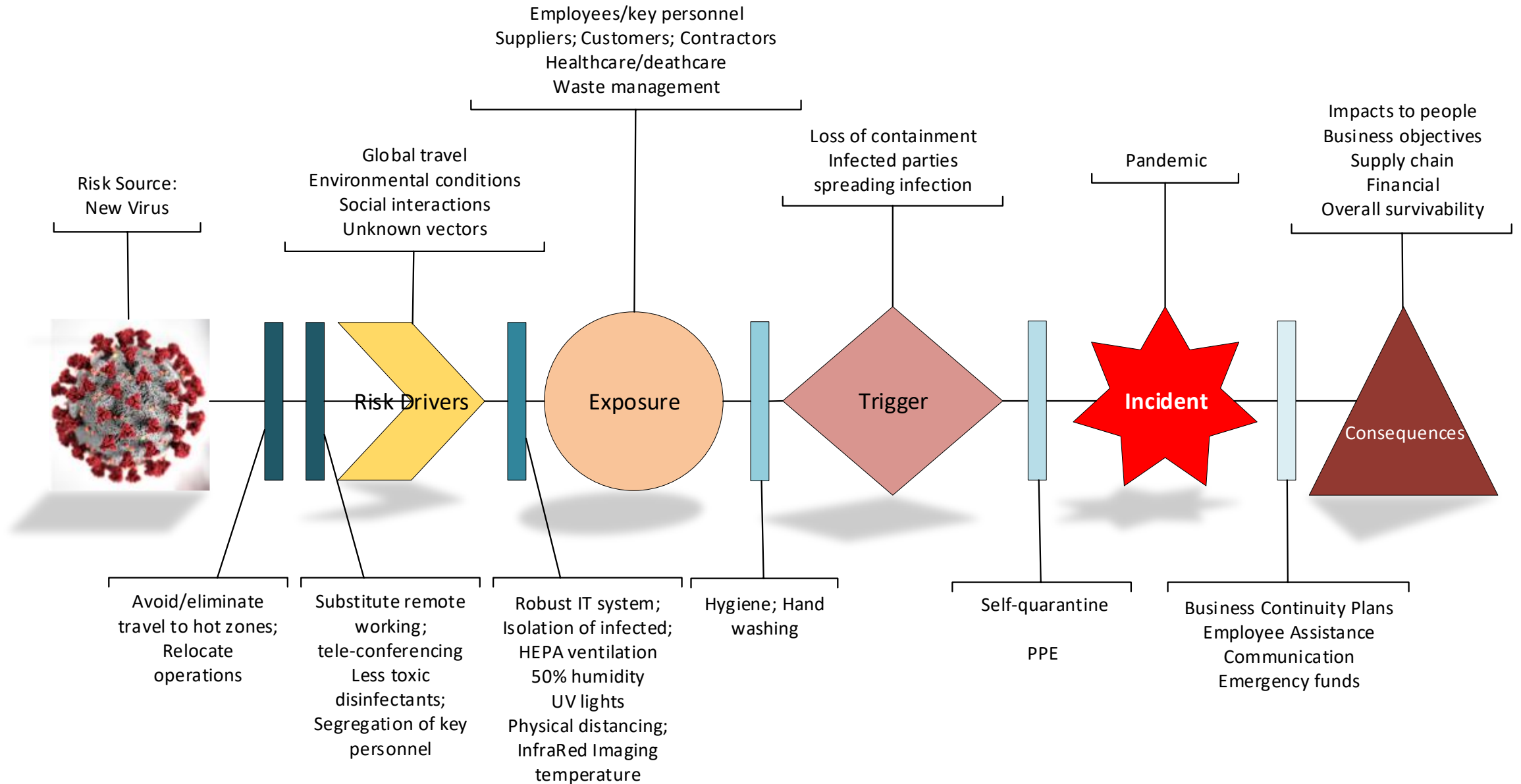
MERV 13	Less than 75%
MERV 14	75% - 84%
MERV 15	85% - 94%
MERV 16	95% or better



Standard 52.5 Minimum Efficiency Reporting Value	Dust Spot Efficiency	Arrestance	Typical Controlled Contaminant	Typical Applications and Limitations	Typical Air Filter/Cleaner Type
20	n/a	n/a	< 0.30 pm particle size	Cleanrooms	>99.999% eff. On .10-.20 pm Particles
19	n/a	n/a	Virus (unattached)	Radioactive Materials	Particles
18	n/a	n/a	Carbon Dust	Pharmaceutical Man.	Particulates
17	n/a	n/a	All Combustion smoke	Carcinogenetic Materials	>99.97% eff. On .30 pm Particles
16	n/a	n/a	.30-1.0 pm Particle Size	General Surgery	Bag Filter - Nonsupported
15	>95%	n/a	All Bacteria	Hospital Inpatient Care	microfine fiberglass or synthetic media, 12-36 in. deep, 6-12 pockets
14	90-95%	>98%	Most Tobacco Smoke	Smoking Lounges	Box Filter - Rigid Style Cartridge Filters 6 to 12" deep may use
13	89-90%	>98%	Proplet Nuceli (Sneeze)	Superior Commercial Buildings	lofted or paper media.
12	70-75%	>95%	1.0-3.0 pm Particle Size	Superior Residential	Bag Filter - Nonsupported
11	60-65%	>95%	Legionella	Better Commercial Buildings	microfine fiberglass or synthetic media, 12-36 in. deep, 6-12 pockets
10	50-55%	>95%	Humidifier Dust		Box Filter - Rigid Style Cartridge Filters 6 to 12" deep may use
9	40-45%	>90%	Lead Dust	Hospital Laboratories	lofted or paper media.
8	30-35%	>90%	Milled Flour	Commercial Buildings	Pleated Filters - Disposable, extended surface area, thick with cotton-polyester blend media, cardboard frame
7	25-30%	>90%	Auto Emissions	Better Residential	Cartridge Filters - Graded density viscous coated cube or pocket filters, synthetic media
6	<20%	85-90%	Welding Fumes	Industrial Workplace	Throwaway - Disposable synthetic panel filter.
5	<20%	80-85%	Fabric Protector		
			Dusting Aids		
			Cement Dust		
			Pudding Mix	Paint Booth Inlet	

Hierarchy and Layers





Layers of Control Analysis

Event	Cause	Consequences	Additional LOP						Combined Risks FS			LOMA			Consequences	Risk Reduction LOMA			
			2	3	4	5	6	7	S	L	Risk Sum	Eng. Layers	Admin Layers	Financial Layers		E RM	A RM	F RM	Residual Risk
Potential SARS-CoV2	SARS-CoV2 exposed operator	Workers exposure.	TI Camera - T Check	Social Distancing/ Warning	Ventilation w/MERV 14-16	Separation 2 teams/2 shifts	Deep clean between shifts	PPE				Isolation???	Quarantine & Return to Work	1st Layer 100K retention	Serious Illness and or Fatalities	0.7	0.9	0.95	2.99
Low RH=11%	HVAC not properly operating	Minor respiratory irritation		↑ Increase RH to 50-55%					5	1	5		Business Continuity Plan	2nd Layer 500K to primary	Financial Losses		0.9	0.95	4.28
Chlorine exposure	Cleaning w/Bleach	Minor respiratory irritation	Substitute Bleach w/Less										Temp. Workers	3rd Layer 1 M to Excess Carrier	Loss of productivity		0.9	0.95	4.28

Conclusions



Risk assessment and risk management methods could be used to address risks related to SARS-CoV 2



Layers of defenses have been used throughout the years and have proven to be effective in reducing the risk from multiple threats.



The OSH professional should consider this approach for the workplace when analyzing and designing risk reduction measures



Rarely is one control method adequate in preventing or protecting people, property or environment from harm.