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**SDC Talks – Why Google Makes Indoor Air Quality a Top Priority.**  
*PLUS, a worksheet to improve your Indoor Air Quality practices.*

Indoor air quality (IAQ) has been a popular green topic for decades, though few of us on the Tenant and Landlord sides feel empowered to take charge and make a change in our own buildings. Yet with increasingly longer hours that we spend indoors, this should be a top priority. Poor IAQ is estimated to cost the US from \$12 to \$125 billion (including medical cost) per year due to loss of productivity and missed work (US DOE).

While monitoring and management of IAQ has historically fallen onto the Landlord, an increasing number of Tenants are paying close attention to their own air quality and taking efforts into their own hands. Technology Tenants and startups, which are so instrumental to our economy today, are acutely aware of the fact that office space has become a greater part of our lives than it ever was before.

Offices are seen as a strong recruitment tool where preferable work environments allow better productivity and growth. Hiring a top developer can mean a difference between being a \$10 million and \$10 billion company. Employees are often present at the office from 7 am to 8pm – and frequently later. The desire to be in the most convenient location in a building with the best amenities forces Tenants to buy or lease the minimum space possible at premium rates. Coupled with high growth rates and long lease terms, our days are spent in an extremely crowded work environment.

During the 2015 Greenbuild Conference, the Google [e]Team presented a worksheet on how they manage IAQ in their facilities. The room was packed with attendees interested in learning why Google pays so much attention to this and how they, as both Landlord and Tenant, maintain the same high level of work space quality.

For years Google has been ranked number one by Fortune Magazine in their “Best Places to Work” ranking, which was again the case in 2015. Therefore, the answer as to why IAQ is so important for them is simple: employee comfort and increased productivity. As a tech Tenant myself, I can attest that this concept is true for virtually all tech companies. The moment a tech company has some cash in the bank, these funds are spent on improving the quality of office space.

The [e]Team emphasized the fact that the tools and technologies they use are simple and available to everyone. Under the slogan ‘Be the Sensor’, the team

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promoted the idea of that YOU are the best tool to evaluate the comfort level of a certain environment. Additionally, tools such as the [EPA IAQ School app](#) were cited. The team also circulated a worksheet which they use on an ongoing basis to track IAQ in their offices.

I have recreated the worksheet to share practices of a company that cares deeply for its employees. I encourage you to study the worksheet, circulate it among your management teams and Tenants and encourage them to implement these practices in your own properties and offices.

Indoor air quality will be a growing topic as more companies recognize the value in providing the best work environments for employees and Tenants. The next time you're in the office, breathe deeply and think about your IAQ. According to the International Center for Indoor Environment and Energy, improved thermal comfort, reduction in indoor pollutants, and enhanced ventilation rates and effectiveness can increase productivity by 5 to 10 percent. This would give us a whopping 192 hours of increased productivity a year per person.

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## Google's Global Approach to Sustainable Operations Activity: Be the Sensor!

The IEQ Walkthrough requires the use of the practitioner's sight, smell and hearing senses. The best sensors in the world are the ones built into our bodies. **As you enter the room, take note of what you see, smell and hear** - that information will come in handy later during our short activity.

An IEQ Walkthrough at Google addresses air quality, acoustics, thermal comfort, visual comfort, and the users connection to nature. We have structured the walkthrough such that the facilities team can sit down and complete sections about the building and mechanical systems, policies, and practices at their desks - but then are prompted to get up, walk about and check their spaces out!

Today, we are only able to share a snapshot of the full IEQ Walkthrough. In an effort to present a well-rounded snapshot, we have completed some of the sample content ahead of time and will lead you through the sensory portion of the walkthrough in this session room. We hope you leave understanding a crucial component to the sustainability practices our facility teams implement!

Below are the sections that typically make up our IEQ Walkthrough and the descriptions associated with them.

<b>Building Information</b>	This section asks for general information about your building. This is an important contextual section that will aid once you sit down to review the walkthrough results.
<b>Building Location and Vicinity</b>	In this section, you may need to walk the exterior perimeter of your building (even if you are a Tenant). You are looking for potential sources of contamination, like standing water (algae & allergens) or idling cars near windows or air intakes. This section helps us set expectations of the exterior conditions and what may be influencing our IAQ. This is an important contextual section that will aid once you sit down to review the walkthrough results.
<b>Facilities Team Interview</b>	In this section, you are seeking to gain a comprehensive understanding of whether there are existing IEQ/IAQ best practices in place and identify potential problem areas. The questions may require you to talk to other members of the facilities team or the building operator. This is an important

contextual section that will aid once you sit down to review the walkthrough results.

**Air Intake &  
Exhaust Location  
and Condition**

In this section, we are seeking to understand how air is entering the space, what quality of air may be entering the space, and the variables that affect the air coming into the space. You will either be walking around to determine the answers to the questions below or you may already know the answers and can fill them out at your desk.

In this section, we ask questions about air intakes and exhausts on the roof. We visually inspect for contamination from the exhaust to any air intakes, and any other potential air intake disturbances.

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**Loading Docks**

In this section, we visually inspect the loading dock area and note whether any pollutants (e.g., car exhaust from idling trucks) can enter the building via the loading dock.

**Ventilation System  
Maintenance**

In this section, we are seeking to understand how air is entering the space, what quality of air may be entering the space, and the variables that affect the air coming into the space. You will either be walking around to determine the answers to the questions below or you may already know the answers and can fill them out at your desk. We ask questions about responsible parties, maintenance schedules, etc.

**Roof**

In this section, you are looking potential issues that may arise from the roof, such as puddles and clogged drains that may lead to interior leaks and mold issues. If for some reason, you cannot get to the roof or do not need to inspect the roof elements, please note why. You will visually inspect the roofing system itself for potential contaminant sources.

## **Building Interior**

In this section, you will walk each area of the space to identify potential sources of air quality contamination and other things that negatively impact the rs' overall experience. Look for: stained and/or sagging ceiling tiles, flickering lamps, glare on computers and surfaces, exposed insulation, dust buildup on surfaces, dust build up in plenums, streak marks coming from duct joins and vents. Listen for: noise reverberation, echos, and other acoustics issues. Also, visually inspect the janitorial closets for types of products stored, condition of stored products (open bottles?), and ventilation.

[Note: You may be able to complete some sections at your desk. But, walk around to confirm what you think you know and to take photo documentation.]

## **Occupant Interviews**

In this section, you will engage occupants in a light and curious conversation. Gently inquire about their experience - you do not need to explicitly ask them every question on this form, just note what you take away from the conversation. We suggest talking to at least one person per floor. Remember, do not alarm occupants by saying you are looking for air quality issues. When they ask you what you're doing, consider saying, "I'm doing research to create a profile of our environment".

Building Information	
Question	Notes
<b>What is the age of the building?</b>	The convention center opened in 2003
<b>What is the space square footage/meters?</b>	4,000 sqft
<b>Which floors does the space occupy?</b>	2nd floor
<b>How many floors does the building have?</b>	5 floors
<b>Date of IEQ Walkthrough completion</b>	11/20/2015
<b>Who is involved in this IEQ Walkthrough?</b> Note: ie, who completed the form, who helped track down information, etc.	John Doe & Jane Doe
<b>Are the building and/or space plans and mechanical drawings available and accessible? If yes, where? Are the building plans current?</b>	Yes, available on internal network. Plans are current.
<b>What is the building renovation history? Is renovation performed during periods of occupation?</b>	Grand lobby Salon Retrofit Project was completed 2010, the opening of the connected Marriott Marquis was completed in 2014.

## IAQ/IEQ Management Plan

Question	Notes
<p><b>What IAQ/IEQ management measures are in place?</b>            Note: If yes, please outline your IAQ/IEQ management plan. An IEQ/IAQ management plan may include IAQ testing, sensors or monitors that you use to assess the IAQ, acoustics, humidity, etc. of your space?</p>	<p>CO and CO2 sensors are connected to each system to ensure appropriate fresh air levels are maintained in each meeting room exhibit hall and common area.</p>
<b>Occupant/Complaints</b>	
<p><b>Have you received IEQ/IAQ related complaints?</b>            Note: If you have received IEQ/IAQ related complaints, what were they? What measures were taken to resolve? Please give some examples.</p>	<p>Yes, sometimes during event education sessions.</p>
<b>Cooling Tower</b>	
<p><b>Does the building have a cooling tower?</b> Note: If yes, what is the cooling tower maintenance plan? Specify who performs the cooling tower maintenance.</p>	<ol style="list-style-type: none"> <li>1. The building has two four-section cooling towers. The cooling towers are used for servicing the chill water plant. Make up water and drain water is metered and recorded daily. Water is softened prior being added as make up to the cooling towers in order to reduce chemical and need and to reduce water blow down.</li> <li>2. Computerized water treatment systems ensure appropriate chemical feeds in order to reduce water consumption. Manual tests are completed daily to ensure the water treatment system is operating at peak efficiency. During fall and winter periods, one tower system is drained to alleviate the need to use electric heaters to maintain temperature. The condenser water system uses bag filters to maintain water cleanliness and in-season tower cleaning is completed using a</li> </ol>

	swimming pool type vacuum system in order to reduce the need to drain the towers for cleaning.
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Ventilation System	
System Description	
Question	Notes
<b>What are the minimum and maximum outdoor-air flow-rates?</b>	OA minimum setting is 10% and automatically modulates based on CO2 se
<b>Only mechanical, only natural, or hybrid ventilation system?</b> Note: Specify which type	Mechanical with free cooling. The building's central plant provides heating water, chill water and emergency power. The Chillers are Trane CVHE and operate art around .42KW per ton. The boilers are five pass high efficiency dual fuel - Natural gas/ #2 low sulfur heating oil. Variable frequency drives and computer control systems throughout the facility ensure that only the appropriate amount of energy is sent a given area. Air handlers throughout the facility are either fixed volume - in large areas or VAV systems in meeting rooms, spaces and other grouped sections. Each air handler is equipped with Variable frequency drives on supply and return air. Each large air handler can operates on up to 100% outside for free cooling when appropriate. CO and CO2 sensors are connected to each system to ensure appropriate fresh air levels are maintained in each meeting room exhibit hall and common area. General operating temperatures for occupied space is 72- 74 degrees F. and is adjusted based on humidity and customer requested temperature. Areas not in use are shut off when not in use. Central plant is shut off or modulated based on facility occupancy. Smaller stand alone HVAC systems have been installed in 24- hour areas of the facility allowing the central plant to be shut down during off hours. _ see link on central plant - <a href="http://www.spearsvotta.com/projects/dc_convention_01.html">http://www.spearsvotta.com/projects/dc_convention_01.html</a>
<b>Are the returns ducted or via plenum?</b>	In the 2.3 million square foot facility, return is ducted in many areas, most meeting rooms use a plenum return ceiling feeding the return ducts located in each room.

<p><b>If you have operable windows, are windows ever opened? How frequently?</b>          Note: Where are the operable windows located</p>	<p>There are no operable windows in the facility. Exterior roll up doors in the exhibit halls are used at times during move in periods for fresh air when mechanical systems are not needed.</p>
<p><b>Filtration type and MERV or E.U. CEN rating, maintenance/change-out schedule?</b>          Note: Describe the filter maintenance schedule and whether filter replacement is based on time interval, visual inspection or pressure changes. If filters are cleaned regularly, please note cleaning schedule in relation to replacement.</p>	<p>Most of the facility is equipped with a two stage filtering system. The first stage is a 2" pleated filter Merv 8. The second stage is Merv 13 Metal box filter. Filters are changed based on run time and static air pressure drop across the given filter bank. The facility will be installing automatic air sensors to monitor filter status and generate maintenance tickets to replacement filters when filters are at manufacture's recommended resistance. Currently the first stage filters operate between 3-6 months depending on equipment run time. The Second stage filters are in place 1.5 to 3 years depending on air flow restriction.</p>
<p><b>Location of air supply and return vents?</b>          Note: Are they designed for efficient air distribution? Is short-circuiting a potential problem? Are the supply and return too close together?</p>	<p><a href="https://drive.com/open?id=OB90Li9E0Uml7N25EMU96SEVYMDJmZ2JCOzhCZEM3UK5QQnY4">https://drive .com/open?id=OB90Li9E0Uml7N25EMU96SEVYMDJmZ2JCOzhCZEM3UK5QQnY 4</a></p>

**Applied Chemical Sources**

**Pesticides**

Question	Notes
<p><b>What is your pesticide usage program?</b>          Note: Specify if you know what pesticides are applied, and if pesticides are applied during periods of occupation. Please provide a link/location, if program rules are published online in Drive.</p>	<p>Pest management is controlled using traps, inspecting areas and removing nests, and path ways, and when needed a very limited amount of mild pesticides are used. These are applied if needed according to the breeding cycles of the focused pest.          Note: Specify if you know what pesticides are applied, how frequently they are applied, and if pesticides are applied during periods of occupation NO pesticides are applied in occupied areas.</p>

Cleaning and Maintenance	
Question	Notes
<b>Do you have a Green Cleaning policy or program in place?</b>	Green cleaning is used throughout the facility. Housekeeping uses the Orbital system in for almost all cleaning chemicals. Other chemicals are green seal. Micro fibers programs are in place throughout the facility. HEPA vacuums re used in most areas. The kitchen runs a separate green cleaning program.
<b>Is training provided? If yes, who facilitates the training?</b>	Housekeeping management team trains the staff on appropriate cleaning practices.
<b>Do you have a list of cleaning products used?</b>	A list of products is kept by the housekeeping management.
Air Fresheners	
Question	Notes
<b>Are solid or plug-in air fresheners anywhere in the space or common areas of the building?</b> Note: state whether they are in restrooms/locker rooms/reception areas, whether they are mounted on the wall or free standing, and if they are periodically emitting or constant.	(Examples include Air-Wick, Waxie, Rubbermaid, Fabreze plug-in, fragrance diffusers)
<b>Are spray or canister air fresheners anywhere in the space?</b> Note: state whether they are in restrooms/locker rooms/reception areas	Cartridge and spray air fresheners are used in some key restrooms in the facility. Most of these are used only during large events.

Building Interior	
Question	Notes
<b>Overall impression of the space (Elaborate!)</b>	
<b>What type of furniture and decorations are around the space?</b> Note: Desks, couches, ottomans, whiteboards, etc. Note the brand and make of prevalent furnishings so that the ingredients, if disclosed, can be reviewed.	
<b>Is there a lot of color variation between spaces? Sensory variability?</b> Note: Patterns on the walls, textures, color changes as you move through the space	
<b>Cleanliness/cluttering?</b> Note: Cluttering in personal desk areas, break areas, conference rooms, etc.	
<b>Do you experience temperature variations, particularly related to time of day and sun location?</b>	
<b>Is it humid in any conference rooms or specific areas in the spaces?</b> <b>If yes, where?</b>	
<b>Odors?</b> Note: describe whether you smell cooking odors from restaurants in the building, perfumes, sanitizers, mold or mildew ... anything. Write it down as soon as you smell it and where you smelled it.	

<p><b>Are "johnny cakes" or "urinal cakes" in bathrooms and/or locker rooms?</b>          Note: urinals, drains, etc.</p>	
<p><b>Visible dust settling?</b>          Note: look at surfaces, textiles, vents. Take photos!</p>	
<p><b>Describe the cleanliness of the system</b>          Note: If return is plenum: check to see if it is clean and that there is not any dust and dirt collected in the plenum area. If return is ducted: check to ensure that joints are sealed and that the return vent isn't positioned over dusty or dirty ducts .</p>	
<p><b>Note the noise level</b>          Note: Be descriptive. Is the space generally quiet? Noise coming from break and game rooms</p>	
<p><b>Note if there are hard surfaces</b>          Note: Mostly hard, mostly soft, mix of hard and soft</p>	
<p><b>Is there any exterior noise infiltration</b>          Note: Noise coming in from outside, such as traffic or construction?</p>	
<p><b>Note lighting quality</b>          Note: Be descriptive. Is there glare falling on computers and desks that you can see? Too dark in some areas? Where? Take Photos!</p>	
<p><b>Do occupants have access to daylight from their seats? All, some, none?</b></p>	

<p><b>Printers/copier areas separately exhausted?</b>          Note: is there a return air duct?          does the return air get recirculated?</p>	
<p><b>Is there visible water damage? If yes, note the location of the damage.</b>          Note: Look for stained ceiling tiles and carpet, water residue on window sills. Take photos!</p>	
<p><b>Is there visible mold and/or mildew around the space? If yes, where?</b>          Note: Take photos!</p>	
<p><b>Is there condensation on surfaces or in the windows?</b></p>	
<p><b>Are any locations around the space drafty?</b>          Note: locations where there is noticeable air movement coming from outside</p>	
<p><b>Did you see any bowed ceiling tiles? If yes, where?</b>          Note: Take photos!</p>	