

This is a discussion about our behaviours: The way we approach buildings and the way the buildings ultimately behave. This is where real sustainability becomes not only good for the environment, but also good for business – both for design professionals and their clients. Choosing ‘better materials’ as a substitute for real sustainability is the equivalent of choosing palliative care over a healthy lifestyle.

CONVENTIONAL CONSTRUCTION KILLS THE ENVIRONMENT

Our buildings, not our cars or our industries, but our commercial office buildings are the main culprits in the destruction of our environment. They reached this dubious position through gross energy use, land grabs, long building schedules, greenhouse gas emissions and creating massive amounts of material waste. The problem isn't the exterior – though advances in materials can certainly make them more efficient. The interior is the villain.

Conventional office interiors use too much space. They encourage electricity and HVAC gluttony. They aren't built to last. The interior is prepared for absolutely nothing. Not success or downward trends. Not technological changes. Not new competition. Nothing. Every time a change comes along – parts or the entire interior must be demolished, disposed, re-designed and re-built with new raw materials mined, logged, transported, refined and procured. No matter what materials you choose to do this with, it is not sustainable.

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DESIGN PROFESSIONALS ARE LEADERS IN FINDING A CURE

The first to step up to the plate to try and fix this problem are design professionals. They constantly upgrade their skills in environmental design. That is actually very lucky for the rest of us because the design community cares most deeply about the built environment. Even though it is their bread & butter – it is also their calling.

They are the ones who can balance the environmental requirements with end-user comfort and their clients' success. They want their clients to thrive in their design. They also have families and live on planet earth with the rest of us – so it is in their own best interest to do what they can. But some of the tools given to them aren't doing the job...

LEED IS A PLACEBO

First - we should all be thankful for LEED and the USGBC. They are the ones getting the word out about the need for changing our buildings. If it weren't for LEED – many wouldn't know where to start creating sustainable buildings.

But LEED is just that – a start. It's our first official step in green building in North America and shouldn't be considered the “be all end all cure” for our ills. As LEED is written now, except for a trial run for Healthcare spaces, it misses much of the big picture of sustainability. Most of the rating systems have yet to focus on the first and most important of the Rs - **Reduce and Reuse.**

We're so busy counting LEED MR points (Materials and Resources), we are distracted from more long term strategies that increase the use and life of the space. We should be focusing on the merits of how to design space that enables the



interior to be built with the fewest materials possible, in the shortest time, with the most options for function and aesthetics. Just as important, it needs to flex with the inhabitants needs. Flexible interior planning yields true sustainability. Sustainability is truly the most important attribute of any product, structure or organization. The definition of “Sustain” is “to endure”, “to continue”, “to carry on”, “to keep going”, or “to prolong.” Unfortunately the positive aspects of “Building Green”, “LEED” and “Recycled Content” let good press overshadow the most important aspects of true sustainability.

BETTER MATERIALS SIMPLY LEAVE A NON-TOXIC CORPSE

Recycled materials, and materials that can be recycled, won't change the outcome for the environment. Space is still wasted and the physical space is still static. It is ripe for nothing except demolition and then at best: Recycling.

Recycling happens when you've run out of ideas. Recycling shouldn't be your first thought - it should be your last.

WATCH FOR THE SYMPTOMS

Studs and drywall.

It's a method of construction first introduced in 1833. Here in the 21st century our fast changing businesses mean Conventional Construction creates unnecessary waste. It is built on-site. Materials arrive in a certain order and must be cut to fit. When a ceiling height is 9' 2", ten-foot sheets of drywall have to be paid for and cut down. For each transom, bulkhead and column, drywall and studs are cut.

For every square foot of drywall built brand new - one pound is disposed. Once in the landfill it's exposed to the elements - making it a hazardous waste, as it releases deadly hydrogen sulphide gas. Of course all this is exponentially multiplied during renovations and the inevitable demolition. 10 - 15% of landfill construction waste is drywall.

The same goes for the wiring of the space. In every project there is at least a 10% contingency fee for all the cut-offs and mistakes. For moves, adds and changes wires are cut and new wire installed in homerun cabling methods.

That cut wire isn't as valuable as it was just a couple of years ago. To even get to the copper you have to strip lead-based jackets off the data cables. When changes are made during installation, those homerun data cables that were cut from the old layout can't be left in the ceiling anymore.

The National Code determined the danger to those in the building and fire fighters due to the lead and toxins in cabling is too big a risk. All unused cable must be removed. (Every 1000 linear feet of data cable can burn for 20 minutes with as high a BTU as gasoline.) There are an estimated six billion feet of cable and wiring in the ceilings of the United States.

NAME FOR OUR PAIN: CATNAP

This is a term from the British construction industry. It stands for:

Cheapest Available Technology, Narrowly Avoiding Prosecution

A.k.a. – the lowest bid.

Shorter schedules, slashed budgets, the bidding process...these have resulted in industry-wide shortcutting and cost cutting. The first two casualties are design and the environment.



The ones who suffer chronically are the poor end-users - but hey! What can you do? This is how it's done. As long as it meets the bare building code, you can't complain about the status quo.

Can you?

THE SCHEDULE IS LINEAR AND THE TRADES ARE MANY

Each step must be done before the next trade can come in. When the next trade does come in – they may damage earlier work. When things get behind schedule, expensive overtime is a necessary evil. Because you are building with raw materials it takes many expert journeymen and their teams to figure out how to put it all together. If there are other tenants in the building the schedule might have to be radically lengthened to include night and weekend work. Which is always more expensive.

Even if by some miracle the original cost stays the same and every part of the design is a pleasure for the contractor and the trades – the conventional construction method is a time consuming, wasteful, inefficient, costly mess.

We haven't even mentioned Change Orders.

TRANSPORTATION POLLUTION IS A SIGN OF CONVENTIONAL CONSTRUCTION

All those trades have to get to the job-site. This means crews arriving via cars and trucks. On a 25,000 sq. ft. project with an average commute of 20 miles, and in the green spirit – we'll say several of the trades are carpooling to work. That still comes to 45,000 miles. The miles are higher for sites choosing to recycle – as you'd be adding another truck coming and going from the site on a regular basis.

RECYCLING IS EXPENSIVE & REQUIRES POLICING

Recycling is something that must be arranged up front and has complete buy-in from all the trades. But what happens when virgin materials drop in price and recycling is no longer a viable enterprise? What will the recycling firm charge then? Will they even stay in business?

But there is so much waste how can you in good conscience NOT recycle. So get more bins. Tell everyone on the job how to separate materials. Get mad at them for not following the rules. Hire a kid to guard the bins. Roll up your sleeves and pull out the lunch bag the kid threw in.

Then you find out your recycling firm is taking most of the waste to the landfill and still charging you more for it.

Recycled materials and recyclable materials do not save buildings. They create kinder, gentler garbage that still results in transportation and industrial pollution. Recycling uses energy, creates greenhouse gasses, requires infrastructure and must have a viable business plan to turn into another sellable product.

ONE CONVENTIONAL 'CURE' IS TO GET MORE SPACE THAN NECESSARY

Meanwhile back at the tenant's space, they are trying to find a way to make their real estate work for their business model. The Conventional "cure" to give an office more flexibility is to get MORE SPACE. You not only pay for the extra space itself, you have to heat, cool, light and secure it... just because you might need it later.



Sometimes more space is paid for simply because people want to be comfortable in their offices. Perhaps there is a little ego at play too.

LEED as it stands now, doesn't penalize space gluttony

When a 24-storey family home with a 168-car garage can get LEED certification you know there's trouble.

When companies with 200 square foot private offices can get LEED certification, you know there is trouble.

When LEED doesn't give any credit to those who see that there might be a problem with indoor sprawl – which leads to outdoor sprawl (and bigger electrical, heating and cooling bills) – there's a problem.

EVENTUALLY YOU MUST DISPOSE OF THE CORPSE

Believe it or not, the material waste and energy use has only been from initial construction. Now what happens if there are big changes or surprise, surprise – the tenant moves out?

Demolition and Disposal.

New crews arrive to tear all or part of it down, haul it away and clean up the space. The total non-residential renovation waste generated is 28.04 million tons per year in the U.S. (56,000,000,000 pounds.)

HOW'S BUSINESS

Employees, visitors, and day-to-day business are in the middle of it all. Facing noise, disruptions, fumes and possibly the cost of swing space. Tenants have to make arrangements with the building landlord to do this work. It may require after-hours (meaning expensive) labor.

All this takes time, effort, patience and as always - money. Not just the obvious costs – but the cost of not being agile enough to adapt to new economies, technologies and opportunities. It all eats away at the advantage you are hoping to gain with the new configuration.

Workspace studies show that the most successful companies in the world have high-performance offices to match their strategies and tactics.

ARE YOU INFECTING YOUR CITY?

Ultimately, the building itself will be in jeopardy because it becomes notorious for being under renovation more often than not. The older the building and the more old world charm it has - the less it can cope with the combination of 21st century technology and business with 19th century construction methods.

Older and established buildings offer cities a sense of history and craftsmanship no longer affordable in our world. They are in good locations. They are close to infrastructure and public transportation. It is in everybody's interest to keep buildings viable. You do that from the inside.



THE ANTIDOTE IS PREVENTION

Like a smoker trying to be healthier through choosing a so-called light cigarette or natural tobacco - it won't work. Unlike quitting smoking, where you are giving something up you enjoy – even though it is bad for you – the answer to interior construction is actually preferable. And there's never been a study showing drywall is addictive!

MODULAR INTERIOR CONSTRUCTION: FOR A LONG, HEALTHY LIFESPAN

The old saying “An ounce of prevention is worth a pound of cure” is completely accurate when it comes to choosing how you are going to build-out space.

By creating beautiful and functional interior space with pre-manufactured, modular elements, particularly ones that support all other elements and are parametrically engineered to integrate with the building – Initial material waste, transportation pollution and sprawling real estate are prevented. But that's just the beginning.

The most important attribute of anything we own, use or buy is that it can **stay in use** or “sustain”. Only products embodying this give us the maximum return on investment, the minimum cost of ownership, the least environmental impact... in other words the greatest value. The current vernacular of *sustainability* is in many ways depriving us of sustainability's greatest virtue.

If you plan and design interior space with the underpinnings that business is dynamic, you will have a business asset that allows you to be faster and more agile than your competition.

Physically, a Modular Interior starts off as an empty space with concrete and windows - like every other space. But even at that point you can have flexibility in mind. Movable sprinkler heads, sound-masking for entire space (not just private offices), indirect lights, an access floor with user controlled HVAC and plug & play power and data, modular carpet tiles, modular walls that support all new and any legacy furniture.

Compared to Convention Construction, this method and these solutions mean a shorter schedule and fewer trades. For that 25,000 square foot project, with crews commuting an average of 20 miles: This would mean 24,450 fewer miles are travelled. That's a 45% reduction in transportation pollution and petroleum used.

IF YOU HAVE TO RECYCLE – DO IT IN A CONTROLLED ENVIRONMENT

Manufacturing facilities are able to order inventory more precisely and consistently. So they are able to get a better price break and store all their materials in a secure, dry warehouse - rather than at an open building site. When there is waste in the form of cut-offs - they are in pristine condition for recycling and there are controlled recycling systems permanently in place.

BETTER LIVING THROUGH TECHNOLOGY

Manufacturers, design professionals, engineers...we all leave most end-users feeling out of the loop. Most people cannot look at a 2D drawing and understand what it will mean to their 3D world. Our jargon makes them feel like an exchange student. Ultimately they end up with a space that really wasn't what they were expecting. Often they just live with it. Just as often changes are made, which means knocking down, pulling out and disposing brand new spaces and their infrastructure. More money, and more waste.



Clients need to feel confident they are choosing the right solutions for their project. Because renderings take so long to produce and end up only providing a few views of the space - clients will often ask for mock-ups. Where do the mock ups go at the end of the exercise? They don't fit anywhere else. They are built to the specifications of that client. Rarely does the client want the winning mock up. They end up in the landfill unless they can be sold at a cut rate, or donated to non-profit organizations.

New graphical and interactive technology used at DIRTT allows design professionals to create better spaces while providing a better understanding for the client. We live in a world where the image is king, and because every computer has the ability to play first person, interactive videogames, our computers can now provide a videogame in the design environment. ICE® software is a graphical tool to envision, specify, confirm, manufacture and install built environments.

Better technology makes us better stewards of the environment too. Entire forests are felled for product catalogues – which, by the way, are out of date the day they are printed. Then there are the shiny brochures with their color ink and lacquers – filled with photos we hope will be appealing and provide a hint of what we can make.

ICE software provides visual confirmation completely integrated with product specification, pricing and manufacturing information, meaning design professionals save time and miles travelled for meetings with clients and collaboration with team members. It empowers clients to make decisions faster and with confidence, without a mock up, because they can see exactly what they are getting and for what price. Aside from saving transportation pollution, design firms provide better service faster and give their clients a chance to truly experience their design.

DIRTT's production facilities across North America virtually eliminate human error because the design done in ICE directly delivers the production instructions. The design professional can be assured that the drawing is what is being manufactured. There is no compromise of design.

FOOTPRINTS

Let's talk about footprints. At its essence, it is a quality versus quantity argument. In North America we have somehow lost our affinity for efficiency. We've been convinced that more is better, rather than better is more.

European Houses vs. North American Houses

New houses in the U.S. were 38 percent bigger in 2002 than in 1975, averaging 210 square metres (2,265 square feet). This is twice the size of typical homes in Europe or Japan.

They live in smaller dwellings for three reasons

1. Land availability
2. Cost of land and materials
3. Footprint of towns and cities hundreds of years old and their homes must fit inside those cities

The result is quality. They make the best of minimal space with design as their tool for form and function. They use less power, water, heating and cooling and yet, they have a longer lifespan, a higher degree of life satisfaction with their smaller ecological footprint. Why wouldn't we all want that?



Something as simple as a sliding door can save hundreds to tens of thousands of square feet. Just removing a swing door from the equation saves 9-square feet per office. A 10x15 can turn into a more efficient and effective 10x10 without any sacrifice to the end user.

20,000 SF usable area @ \$34.50/SF rent & operating costs: 10x15 offices and 8x8 workstations

	People	SF/person	Rent & Cost/person	Savings	Space Reduction
Typical	110	180 SF	\$6,245		
	30 -Offices (10x10)	168 SF	\$5,796	\$51,750	1500 SF
	80 -Workstations (6x6)	152 SF	\$5,244	\$45,540	1,320 SF
Total Consolidation	156 SF	\$5,382	\$97,290	2,820 –7,000 SF	
AMOUNT SAVED	24 SF	\$863			

REDUCED BUILD-OUT COST @ \$78/SF – \$219,960 to \$546,000

REDUCED RENT & OP COSTS PER ANNUM – \$1,167,480 to \$ 2,898,000

MANUFACTURING FOOTPRINT

Are manufacturers walking their talk? Is their factory a good community member? Are they creating as small a carbon footprint and real estate footprint as possible themselves?

By having ICE, DIRTT lessens our own real estate and carbon footprint. It helps control inventory, flow and project allocation. A smaller factory means better communities, better air quality, less waste and less energy use.

MOVABLE WALLS NO LONGER COMPROMISE DESIGN OR FUNCTION

Movable Walls or ‘demountable walls’ have been around since the 40s. They started out looking temporary and, until recently, have added little in the way of functionality when it comes to supporting furniture and storage.

You can’t blame design professionals for being reticent to choose movable walls. The way they were built in the factories left little room for real design innovations and often the manufacturer would have to compromise the design so they could build their standards.

The new generation of walls at DIRTT are parametrically engineered to perfectly integrate with design and surrounding architecture and modularity. They have horizontal support that accepts any furniture or millwork. Each side of each wall offers independent aesthetic and functional opportunities. Solid movable walls have skins clipped over their frames for easy access to power and data and easy refinishing or small reconfigurations.

HEALTHCARE IS THE FIRST SECTOR TO GET CREDIT

To be fair, the USGBC is coming around. They are currently testing the idea of offering LEED credit opportunities for both movable walls and sound attenuation in Healthcare sectors.

Until DIRTT, movable walls were going to be a tough pill to swallow because the manufacturers are often partnered with the suppliers of the mechanical and medi-gas devices without much consideration for design, the medical staff or



the patient. Happily that is changing. In fact for the first time architects, designers and end-users have been asked to participate in the product development for movable walls in patient care. The results are more design freedom, more efficient use of space and a better patient and staff experience.

CONTROL DESIGN INTENT INITIALLY AND IN THE FUTURE

One of the design benefits of an agile, modular space is the long life the design will enjoy.

In a Conventionally constructed space, usually the first renovation is the first bite out of the initial design intent – and it is always due to cost. The client has lost the economy of scale because a small renovation won't get the same price break. Suddenly the design is compromised.

The ability to make large renovations without damage or small personal changes for each end user will help protect the design of the space. (For instance – the DIRT face-mount tile wall is engineered so tiles can be switched out to suit individual work styles without employees jerry-rigging their own solutions.)

SUSTAINABLE AGILITY IS A BUSINESS STRATEGY

Clients choosing sustainable agility do so because they see it as a business strategy:

- ☐ For negotiating a longer and more beneficial lease
- ☐ Faster move in
- ☐ Adapt quicker and with less pain than their competition
- ☐ Confidence to make good business decisions – the space and employees can take it
- ☐ Employee retention
- ☐ Possible tax advantages due to interior elements not affixed to the base building
- ☐ A valuable, sellable asset

COST IS NO LONGER AN ARGUMENT

Since the inception of modular walls, a war rages between General Contractors and manufacturers of the wall systems. The cause of the battle is the question, “What's the true cost per lineal foot of wall?” Clients find themselves caught in the middle wishing they had the facts to make an informed decision.

The downstream benefits of having re-locatable and therefore reusable walls have always been obvious, but if initial construction costs are higher, it is harder to convince stakeholders they are worth the premium price. Over the years manufacturers gave generic examples of how modular walls probably wouldn't cost more, or would be “first cost effective” – but they couldn't or wouldn't provide line-by-line costs. But for that matter... neither would the GC.

Real numbers and tools are available from the industry standards laid out in RS Means and IFMA's Benchmarking guides, among others. Every foot of material and hour of labor costs across North America is available for comparison. DIRT developed a comprehensive data tool using all this available information. It is called ICEberg® because it looks at the hidden costs. ICEberg not only counts every dollar in a blow-by-blow comparison of the same space initially constructed with Modular elements vs. Conventional, it counts up the environmental cost for each. And only then looks at the future potential savings with an agile space.

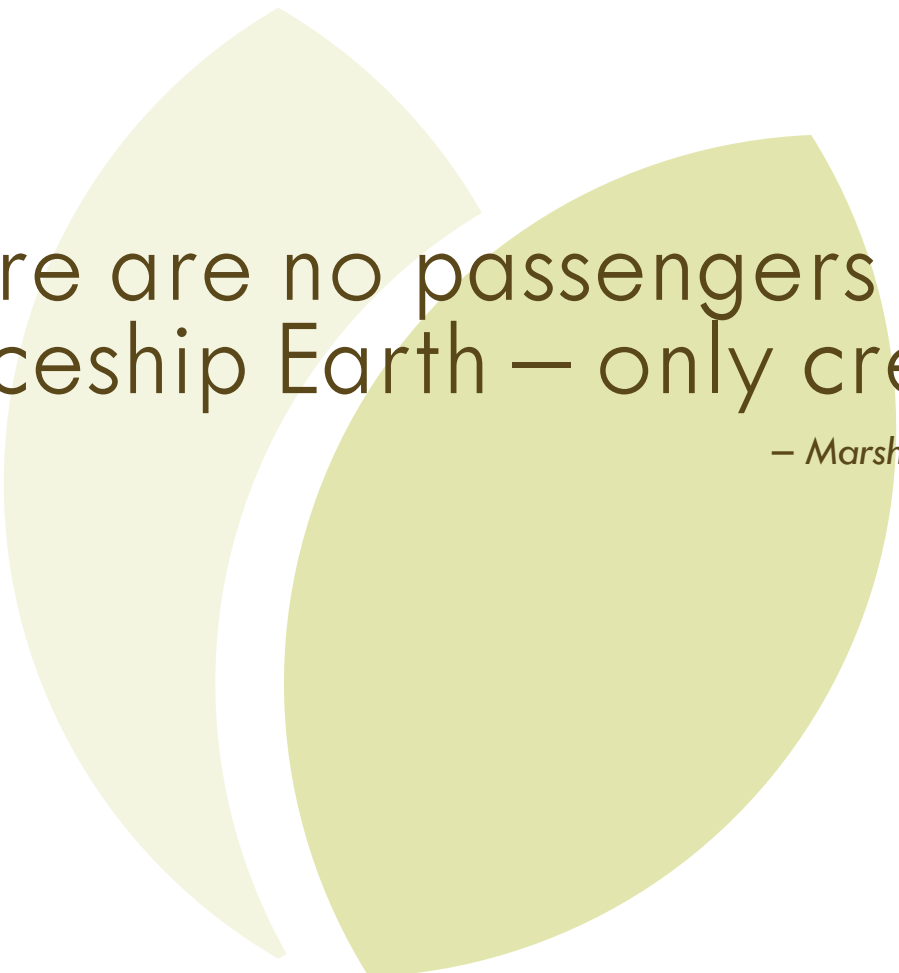


The key is to count everything. Hide nothing. This is very unlike construction has historically been approached. But when you add up all the labor and anything a client wants beyond a vanilla wall with home run cabling to a few select spots, all of a sudden the real price is very different from the original quote.

WILL WE ADOPT BETTER BEHAVIORS BEFORE IT'S TOO LATE?

The studies done by Architecture 2030 predict a dire future for the planet if more isn't done to lessen our buildings' demands for space, energy and materials immediately. We are out of time for small changes in materials and need to radically change our behaviours.

The good news is that these new behaviours do not sacrifice design, comfort or function. In fact we can improve our lot in life by being more environmentally sustainable. It is a myth that we must lower our quality of life to ensure the future of earth, in fact we need to increase it.



“There are no passengers on spaceship Earth — only crew.”

— Marshall McLuhan

