

What are the responsibilities of the Infrastructure Services department at Microsoft?

Infrastructure Services at Microsoft falls into a group known as Global Foundation Services (GFS), which has the monumental task of providing infrastructure, operations, centralized infrastructure budgeting, and fiscal oversight, along with providing security to all of our online products. My group — Data Center Services — is primarily in charge of Data Center Design and Data Center Construction efforts, including site selection and the long-term operations of those facilities.

What factors do you weigh when choosing a site for a high-tech facility such as a data center?

Microsoft uses more than 35 factors in selecting locations. These buildings closely resemble the computer systems that reside in them. Eighty-five percent of the cost of these buildings is tied up in the electrical and mechanicals systems alone. Our site selection process, or heatmap process, has mapped out the globe at the country level, state or likewise denomination, and local metro areas across each of these areas. We then apply specific weights to each of these criteria; the result is a map of the world colored green to red for good to bad places to explore.

Tell us about the 35 different criteria you use in choosing a data center location.

As we progress in perfecting our data center designs, and incorporate new technologies to drive for greater and greater efficiency, we adapt the heatmap to incorporate our new findings. Each class of data center has specific technical specifications associated with it that will make certain areas more or less viable for location. As we continue to push the barrier in design, efficiency, and performance, more important variables begin to emerge. Power, availability

of fiber networks, and proximity to end-users are some of the key elements in the process.

What are some of the challenges you're facing?

As more and more people adopt our products and services online, this drives the need for capacity. You have to think about servicing the entire world from these facilities, across hundreds of products and services. On average, Microsoft has nearly 550 million unique visitors to our products and services online every month. With incremental growth in those services, from a feature and functionality standpoint, data centers are the key to sating that demand.

Why did you choose the city of San Antonio for a new data center?

Microsoft selected San Antonio for several reasons, including their environmental recycled water program, wind power availability, and other natural affinities. It's important for us to ensure that our buildings can be localized to make the best use of resources and communities they reside in. The city itself also offered many advantages; one of the most vital, of course, was having affordable and ample power. We were also warmly received in San Antonio during our selection process; representatives made sure all of our questions were answered.

Microsoft has stressed that this data center will use green technologies and environmentally friendly resources. What are some of those technologies and how did they factor in when choosing San Antonio?

The presence of the recycled water program was a huge draw, not to mention that Texas is the largest wind-energy-producing state in the nation. But it's not the only reason or only application of green technologies. Design



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Michael Manos is responsible for the worldwide operations and construction efforts of all Internet and enterprise data centers for Microsoft Corp. In addition to his responsibility for the ongoing administrative and technical support of servers and equipment residing within these facilities, his role includes the design, construction, and facility-related technology research as it relates to data center architecture. Microsoft is constructing a 500,000-square-foot data center in San Antonio, Texas, that will utilize various "green technologies" including recycled (gray) water and wind technology. Recently *Area Development* spoke with Manos about this landmark site selection project.

of the facilities has a huge impact, and at the end of the day it's all about driving efficiency in the use of power. How do you make your watt go farther? The true currency of data centers is not square footage. It's all about power and the efficient use of that power.

To that end, my teams focus on a variety of possible environmental-friendly solutions. For example, we are retrofitting most of our existing data centers with equipment to decrease power used to cool the racks of servers. On the waterside, we anticipate chilling water and pumping it around in a semi-closed loop system. Also, our buildings are painted with low emissivity (low-e) paints. Low-e paints can block heat transfer through walls. Certain formulations are also highly reflective. We can adjust that reflectivity to meet our heating and cooling needs with less energy. And we are also working with server manufacturing partners to reduce the heat output of our servers. This will not only lower our energy costs, but also drive new markets for these products.

Did the availability of labor play a role in choosing San Antonio?

Not in a significant way. While it's always important to attract the best people, we have been focusing a

large part of our operations on automation. This allows us to operate these facilities with a small team of very sharp and intelligent folks. The roles that are created with these facilities are significant — with a lot of responsibility — so finding great people never truly goes away. We have been very fortunate in San Antonio that we have found a great pool of talent from which to draw.

Are there other data centers in San Antonio? Do these centers tend to cluster together?

There are no other Microsoft data centers in San Antonio, but there is now a healthy population of data centers growing in the area. We actually call it the "data center cluster" effect. It's a phenomenon that we strongly encourage. The more a center of excellence builds up this kind of concentration, the better aggregate support for the facilities themselves, then the greater the impact to the local economy, and the more infrastructure gets built out. It's a win/win situation for everyone involved.

What affect will this data center have on the broader local economy?

The clustering effect is one large potential impact in bringing other data center providers to the area and

building a significant center of excellence on this type of high-technology application. In San Antonio, the presence of the building will have a positive impact on the school system, not just from the school-related tax revenue, but also as we reach out into the local trade schools and universities to ensure that the talent pool remains strong.

What approach do you take when working with local government agencies in the site selection process?

As we explore and 'kick the dirt' in our heatmap process, we tend to keep our activities pretty quiet. Once we decide to take it to the next level, we definitely involve the local agencies in the process. No one truly knows an area like someone from that area, and the level of detail that he or she can provide proves to be extremely valuable.

Do you have other data centers in the process of construction? Can you tell us where?

We are always in site selection mode — that's a wheel that never truly stops. It's no secret that in addition to San Antonio we have some very significant projects under way in Chicago and Dublin, Ireland. Each of these has some truly innovative design considerations. AD



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