How to Stay Competitive, Maximize Efficiency and Increase Crop Value through Environmental Automation

Automation is the future of farming.[1] This is especially true for indoor agricultural companies who can easily automate everything from lighting, irrigation and humidity, to nutrient delivery and more. Automation not only saves time, it guarantees consistency from crop to crop. Farms that automate see yields increase by as much as 40% per harvest [2] by optimizing plant management and harvesting decisions.[3] While 100% automation through AI (artificial intelligence) and machine learning isn't here yet, it is right around the corner.

Profitable environmental automation begins with accurate data collection. Collecting and analyzing big data makes all the difference in efficiency, consistency, yield and profitability. It takes years to gather the data that an effective AI system will need. Any greenhouse owner who wants to compete on a larger scale must collect data now or risk falling far behind.

New greenhouse owners are investing in automation from the start. Established growers everywhere are retrofitting their spaces for automation so they can stay competitive. In fact, the precision farming and smart agriculture markets are predicted to triple by 2025, with more than 75 million smart devices installed by 2020.[4]

There is no lack of companies ready to sell devices, sensors or systems to monitor and automate growing operations.

Choosing not to automate is like choosing not to grow. Only the companies who automate data collection and incorporate predictive analysis will last in today's competitive market.

When you choose the platform that is right for your indoor farming needs, you will see an immediate return on your investment. Your company's value will increase exponentially as you are able to replicate consistent crops, harvest to harvest.

So how do you know which platform and devices to choose?

This document will walk you through the top ten things you should look for when choosing an environmental automation platform.

But first, let's take a look at what automation is all about.

1 https://www.businessinsider.com/internet-of-things-smart-agriculture-2016-10
2 https://www.cannabisbusinesstimes.com/article/the-value-of-automation/
3 http://vinelandresearch.com/sites/default/files/publications/vineland_innovation_report_2018-2019_0.pdf
4 https://globenewswire.com/news-release/2018/03/22/1444017/0/en/Global-Smart-Agriculture-Market-Will-Reach-USD-15-344-million-by-2025-Zion-Market-Research.html

Environmental Automation is Made Possible by Machine Learning and the Internet of Things

Devices are getting smarter and connecting to more things all the time. Machines that learn can discover and highlight patterns in data that people would otherwise miss. IBM's Watson Machine Learning is a prime example. Using IBM's Watson Decision Platform for Agriculture, data from sensors in the soil, satellite imagery and The Weather Company are analyzed to predict risks for disease and pests, or to predict yields for corn crops three months out. It uses the power of AI to give farmers the insight they need to take preventative actions to preserve and improve their crops.[5]

Loosely defined, machine learning is computers and systems that automatically improve with experience.[6] When smart devices are connected through the Internet of Things, they can perform amazing feats. (IoT is simply devices with an on/off switch to the Internet and/or to each other that can communicate together).[7]

E & J Gallo Winery in California incorporated IoT to create a precision irrigation system that reduced water usage by 25%.

> *"Sensors and actuators communicated with a central vineyard control system...the system predicted vine irrigation needs that sent signals to open valves and released the precise amount of water to each vine. Physics-inspired machine learning technologies were used to establish the irrigation schedules."* [8]

Imagine the potential you could unlock by leveraging the power of automation through machine learning and IoT for your greenhouse! You would be able to predict yields and spot problems before they even happen.

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5 https://www.ibm.com/blogs/research/2018/09/smarter-farms-agriculture/
6 https://www.techemergence.com/what-is-machine-learning/
7 https://www.forbes.com/sites/jacobmorgan/2014/05/13/simple-explanation-internet-things-that-anyone-can-understand/#62625b8e1d09
8 https://www.ibm.com/blogs/research/2017/04/iot-grows-innovation/

Challenges Faced by Greenhouse Owners

The key factor for a successful grow is environmental control. Without it, crop-crushing issues take hold.[9] Specialized solutions like IBM's Watson Decision Platform for Agriculture or the precision irrigation system cost well over $100,000 to implement. Most greenhouse owners don't have this kind of capital to invest or the technical expertise to make it possible.

Instead, growers install individual, affordable environmental controls: HVAC, dehumidifiers, thermostats, A/C, automated lights, and basic irrigation systems. Their use increases each year, with more than two-thirds of cultivators automating temperature control.[10] But every device requires some kind of monitoring, especially if they don't already "talk" to one another.

Imagine the devastation of an A/C unit suddenly quitting in the middle of the hottest, most humid night of the year. The dehumidifier keeps running and adding more heat. Soon, the lights turn on, as programmed, further increasing the temperature. Environmental controls create a false sense of security if they do not include a notification system.

Human error is one of the major challenges growers face. Manual watering and fertilizing leaves too much room for error. And even automated sprinklers don't "know" if a plant needs more or less water on any given day. If employees do track data, it could be recorded incorrectly, or it could simply take too long to visualize the data in a useful way.

Inconsistent yields are another threat to agricultural companies, especially those looking to sell to larger corporations or those who need to comply with strict federal regulations. Growers must have accurate data on past yields so they can replicate their crop harvest after harvest.

Automated data collection and environmental controls simply make sense. But with so many different systems to coordinate, it can feel like you're caring for expensive computers and machines instead of plants.

Is it really worth the hassle and cost to set up environmental automation?

Scott Cogdill, Director of Agronomy Solutions at Proagrica believes it is. He says, "Don't view agricultural tech as a roadblock. It's just another series of tools that have become a part of production agriculture to help us make better agronomic decisions. You still make the decisions; the tools just give you the information to make better ones."[11]

9 https://www.leafly.com/news/growing/how-to-perfect-your-grow-room-dehumidifier-setup
10 https://www.cannabisbusinesstimes.com/article/the-value-of-automation/
11 https://www.precisionag.com/systems-management/data/the-power-of-predictive-analytics-in-agriculture/

Start Collecting Data Now So You Can Automate More

Predictive analytics can help analyze what happened in the past, what is happening now, and what will happen next. Farmers can collect objective information about their soil, water, crops and animals. Farmers incorporating IoT can make decisions faster and "enable real-time interventions to optimise production," said Ben van Delden, Head of Markets and Head of AgTech at KPMG Australia.[12]

An automated system that not only tracks data (like soil quality), but also regulates the amount of moisture and which nutrients each plant receives, could actually increase yields by 20-40% in just one harvest. [13]

A digital tracking system makes it possible to replicate data and share it. It gives employees time to focus on important tasks. It reduces the time spent worrying about environmental conditions and helps managers identify issues before they become a major problem. Consistent data helps growers quickly isolate mistakes and successes.[14]

12 https://www.zdnet.com/article/transforming-the-agriculture-industry-using-iot-and-predictive-analytics/
13 https://www.cannabisbusinesstimes.com/article/the-value-of-automation/
14 https://www.cannabisbusinesstimes.com/article/the-value-of-automation/

Automated data collection leads to:

1. **Energy Savings**
2. **Labor Savings**
3. **Consistent Yields**

Automation, through predictive analysis, helps farmers identify problems before they happen. And it makes expansion less costly, because less labor is required. All these factors combined lead to a higher company valuation and greater return on investment.

> Farmers incorporating IoT can make decisions faster and "enable real-time interventions to optimise production."
>
> - Ben van Delden, Head of Markets and Head of AgTech at KPMG Australia

What to Look for in an Automation Platform

It should be abundantly clear by now that data collection is not optional for farmers who want to remain competitive in today's market. But it's not enough to simply collect data. To be truly useful, data must be brought together into one place where it can be analyzed and acted upon: an environmental automation platform.

An automation platform is the hub for sensors, satellites and data collecting devices. It enables devices to "talk" to each other and exports data into useful reports. It likely has a notification system that sends texts or in-app alerts.

Because automation is the future of farming, it is important to choose an automation system that can grow with your business, that won't lock you into a specific vendor, and that gets better over time.

When choosing an automation platform, keep the following in mind:

1 COST TO GET STARTED

How much new hardware is required and how much do the devices cost? Can you keep using your other devices? Is there an installation or activation fee?

2 COST TO MAINTAIN

Sensors wear out after a couple years. Does the whole device need to be replaced every time a sensor wears out, or can just the inexpensive sensor be switched out? Is there a monthly subscription cost? Does the cost increase with the number of data points you measure?

3 EASE OF INSTALLATION

Does a specialist need to set up the system? How long does installation take—minutes or days? Can devices be moved once they have been installed?

4 SECURITY

What measures are taken to keep hackers out of your data? Are the company's websites secure?

5 DATA BACK-UP

Is your data backed up to an off-site, cloud-based location or an on-site server? What happens when the internet goes down or electricity is lost? What if you have limits on the amount of data you can stream? Would you lose all your data if your server was stolen?

6 INDUSTRY STANDARD COMPONENTS OR CUSTOM COMPONENTS

If the components of the automation system are custom made, then they are not industry standard and carry greater risk.

7 CUSTOMER SERVICE

How easy is it to get in touch with the company after your system has been installed? Is the company's focus on the hardware (devices) that you buy once, or on the software (the platform) that you subscribe to? Are service plans available to help with maintenance? Is there a cancellation fee if your service is subscription based?

8 INTEGRATION

Does the platform only work with one specific vendor, or does it integrate with other systems and devices? As your operation grows, can you add more devices? How many devices and dashboards do you need to check to know what's happening with your grow?

9 OVER THE AIR UPDATES

Will your devices keep up with changes in technology, or will they become obsolete after a couple years? Will they automatically receive important security patches and upgrades? Are upgrades included in your plan or do they cost extra?

10 OPEN VS. CLOSED SYSTEM

This is the most important factor to consider. An open system means you will not be locked in to any one vendor, but can integrate with other devices and data sets.
A closed system means that the system is designed to work only with specific devices built by and for a specific vendor.

The Microclimates Solution

Microclimates is a flexible environmental automation platform founded by an enterprise level software developer whose main focus is on security and robustness, and an expert indoor-hydroponic cannabis producer with years of experience managing multiple sites. Together, they designed a convenient and affordable way to monitor growing operations.

AFFORDABLE

While some automation solutions cost thousands of dollars to get started, Microclimates starts at $49/month with only a $249 sign-up fee, and includes everything needed to begin data collection and automation. When sensors wear out, they can be replaced without replacing the whole device.

OVER THE AIR UPDATES, SECURE DATA, & REGULAR BACKUPS

Microclimates is the only automation platform that provides over-the-air updates, which are necessary to maintain security standards. All Microclimates devices, sensors and plug-ins use Enterprise level security components. Microclimates works on Edge servers, which are delivered on-site when the system is set up. If an internet connection goes down, your data will remain secure. If electricity goes down, your systems are backed up on the cloud.

EASY SETUP & INTERFACE

Microclimates' pre-configured dashboards provide out-of-the-box insights to help you get started faster. Our intuitive interface simplifies automation. Plug-n-play devices take only minutes to set up and configure. You can even view data gathered from multiple locations.

FLEXIBLE & EXTENDABLE PLATFORM

Because Microclimates is an open platform, it can integrate with existing devices. Everything can be synced in one place, allowing for precise and easy automation. You control your dashboard set-up to view your most important data the way you want to see it. When you install new devices, you (or a consultant) can write code into the Microclimates platform to automate that device. Open standards in the platform and protocols give you freedom you need to make the system work for you.

Benefits of an Open System (aka Open Platform)

- **Professional grade, constantly maintained and upgraded by experts**
- **Continual security improvements, more robust than any one vendor can write**
- **Interoperability**
- **No vendor lock-in**
- **Use existing sensors and controllers**
- **Write your own processes for alerts and controls**
- **Integrate with external weather data, or any other external data**
- **Unlimited integrations**
- **Over the air upgrades and security updates**

Conclusion

To scale and remain competitive, automation is absolutely necessary. It goes hand-in-hand with data analytics. Indoor farmers everywhere agree—ranking automation and data analytics in the top three technologies they're most excited for. [15]

As you evaluate where you want your grow operation to be in the next five years, and which automation platform will take you there, be sure the platform you choose excels in these top ten features: cost to get started, cost to maintain, ease of installation, security, data back-up, industry standard components, customer service, integration, over the air updates and open system technology.

15 http://www.agrilyst.com/stateofindoorfarming2017

You'll find that Microclimates is the best low-cost, flexible, grow-with-you platform to begin gathering data now so you can surge ahead of your competition.

Call or **email us** to discuss your unique specifications and whether your grow operation will benefit most from a **custom consultation** or one of our plug-n-play **service plans**.

Microclimates is committed to your grow!
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Ready to Automate?

Contact Microclimates at
https://www.microclimates.com/contact-us