bGrid

building data for all

Realizing the world's smartest buildings

Introduction



Karl Van Ginderdeuren

Karl.vanginderdeuren@bGrid.com

The three take-aways:

1. Forget the Silo's

2. Evolving – the World deserves better buildings!

3. Less is the new more



A perfect storm

- Various policies around the world are setting targets to reach higher environmental standards in buildings.
- The economic pressures resulting from the pandemic are focusing minds on ways of achieving **building management cost** efficiencies.
- At the same time, COVID-19 has introduced new rules and ways of working to ensure hygiene, infection control and safety in buildings.
- There is much emerging evidence major corporations are considering making flexible working the norm for their workforces
- The workplace is seen as a reflection of the company's branding and is essential in attracting and retaining talent

In this environment, it is arguable that <u>only SMART buildings</u> will present a sufficiently attractive proposition to potential tenants and workforce occupants.



Ok, but then what is a Smart Building?

Building smart – from bricks to a digital twin

building data for all



Ok, sounds simple!

Imagine this, over the past 60 years



+760%

+60%







A rapid developing but ever changing ecosystem

bGrid



a smart building and it's digital twin are a process not a project!

bGrid ...and it is not a building with another system!

3rd Party Applications



- Sound Intensity (6 Values)
- Humidity

bGrid[®] Node

- Movement (& Occupancy)
- CO₂ & VOC (optional)

bGrid® Smart Building

Asset tracking

M

Blinds

Phone

Connects with Everything

Light & Comfort Mgmt.

Etc.

Infinite combinations of 3rd Party & Partner applications



All stakeholders benefit from a Smart Building



Our commitment

bGrid replaces conventional equipment:

- BMS sensors
- room control
- presence sensors
- light sensors
- light switches
- light management
- cabling

Reduces installation time, delivers openness, flexibility and structured, high density data.

It is the logic way to turn buildings cost effectively smart breaking all silo's down!





is the new more.



bGrid's Data Layers in a Building Digital Twin



IoT Data

Data is generated in a fixed grid throughout the entire building:

- Temperature (IR & Air)
- Light Intensity
- Sound Intensity
- Humidity
- Movement (& Occupancy)
- CO2 & VOC

Real time positioning

- Assets
- Smart devices



Structure

Structured data in API conform Building structure:

- Building
- Floor
- Area
- Island
- Sensor coordinates Context via meta data provided in the API:
- Type of area
- Size / Capacity
- Type of lighting



Geometry

Entire system is building geometry based. Sensing and building controls are geometry or position approachable on basis of:

- x-y-z coordinates
- Room naming
- Position

Behaviour

Machine learning and AI used to identify building misfunctioning and well being improvements:

- Room controls anomalies
 detection
- Air quality meeting room restore time estimates
- Real time & historic room and building performance benchmarking



2 API's to provide:

- Real time data, maximum 1 min. old, some parameters are literally real time updated
- Historic API providing access to the data lake containing raw, and specific processed data.

Business Data

- Real time visualization of building performance and system behavior
- Open API provides raw and process in real time via subscriptions to any 3rd party (45+ today)



Some examples of data to value creation

Real time insights & controls



TVOC measurements



Actual measurement data en settings on area level



Building Meta Data



bGrid[®] building data for all

-

An Example bGrid[®] Machine Learning – Mitigating Desk Sensors





Real-Time Feedback to People Throughout the Office





Building Comfort Analyses

- Identification of comfort issues •
- Meeting room quality and utilization
- Air quality analysis

P

Anomaly detection for control loops ullet

Area type

ABLE

Area

Acoustic Comfort

> 95.8 99.9

> 97.1

96.9 98.6 95.2

86.2 99.3

95.1 91.9 99.4

97.5 98.9

99.8 98.9

93.4

96.2

Light

Index

2.4

14.4

14.9

5.6 0.2

10.3

21

19.9

6.9



All 🗸	All	~	ΑН	\sim	All	\sim
Dote		weekday		Hour		
12/11/2020 1/1	0/2021	Multiple se	elecS	900	1700	
0	-0				0-0)
COMFORT IND	EX		Ares	is with the best	indoor condi	
Area	Temperature	Humidity	CO2	Light intensity	Noiselevel	^
Spare board	2011	40.5	456	130	14.5	1
Freddy	20,0	54,9	853	367	24.4	
Central storage	20.2	48.0		93	14.1	L
Board 4	20.7	38.9		90	13.3	
Board 3	20,4	37.4	522	88	16.4	1
Board 2	19.9	40.5	457	88	14.0	÷
Proord 1	50.0	30.7		1.68	14.4	
COMFORT IND	EX		Areas	with the worst i	ndoor conditi	ons
Area	Temperature	Humidity	CO2	Light intensity	Noiselevel	•
Deard 7	1100	-	in		10.0	11

Area type

				Contraction and the	
Board 3	20.4	37.4	522		15.4
Board 1	20.0	30.7		168	14.4
Board 4	20.7	38.9		.90	13.3
Board 2	19.9	40.5	457	88	14.0
Spare board	20,1	40.5	456	130	14.5
Central storage	20.2	40.8		93	14.1
Eradeha	20.0	2.5 0	-	3.67	50.0

0				Building Floo	ar 🛛
	INDOOR ENVIRONMENT INDOOR ENVIRONMENT QUALITY VS. AREA USAGE		All V All	weekd	
			(i)	0	-O
IN	DOOR ENVIRONMEN	IT QUALITY VS. AREA USAGE	Floor Plan (vs. Area usage)	INDOOR ENVIRONMENT	QUALITY TAE
	100		Explanation of colored quadrants	Area	Therma Comfort
			Good indoor	3C.06 Meeting room	94.5
			environment quality	40.21 Meeting room	94,4
	80 🧯 🐜		for areas with high	3C,16 Meeting room	94 1
	60	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	• Usage	4C.12 Office	95.4
tradity		Bad Indoor environment quality for	6D 04 Open working area	93.3	
ŧ			areas with high usage	6D.02 Meeting room	92.3
Ē	1			3C.05 Meeting room	91.9
wind	- F	• • •	High indeor	50.10 Meeting room	Meteo Multip
10	40	High indoor environment quality for areas with low USage 4	90.4		
문			usage	4C.16 Meeting room	Themas Common 944 1 945 1 944 1 945 1 945 1 944 1 945 1 945
40 environment quality 4c.15 M usage 20 and	50.05 Meeting room	B9.1			
			Areas to investigate: 50.05 Meeting room	87.8	
	20 1. The BM	1. The BMS is adapting	5C.09 Office	87.5	
		accurately by area	5D.05 Office	85.6	
			usage 50.05 Office 2. Areas not used due 5C.08 Office	85.5	
			to e.g. comfort issues	4C.11 Office	84.3
	0%	50%	100%	Receptie	10/2021 Multip IRONMENT QUALITY TAB Thermal Comfort (room 94.5 proom 94.5 proom 94.6 groom 94.6
		50% Avg: Area Usage (%)		4A.03 Meeting room	83.2



Building		Floor		Area type		A/ea	reset filter
All	\sim	All	×	All	\sim	All	\sim
Date			weekdey		Hour		
12/11/2020	1/10/20	21	Multiple	selec	900	1700	
0-		-0)			$\bigcirc \neg$	—

The second

Area	Temperature [°C]	Humidity [%]	Avg. Area Usage [%]	1
3C.11 Room	23.7	26.7	15.9 %	
4A.03 Meeting room	23.4	26.6	13.2 %	
Receptie	23:4	27.6	98.5 %	
48.08 Meeting room	23.3	27.1	39.7 %	
3C.04 Meeting room	23.1	26.1	47.8 %	
44.01 Meeting room	73.0	27.6	0.0 %	
5d.03 Meeting room	23.0	29.0	0.0 %	
5D.07 Meeting room	13.0	28.2	1.5 %	
5A.03 Office			0.0 %	
4A.08 Meeting room	22.9	28.5	6.1 %	
50.06 Meeting room		27.8	1.7.%	
5A.02 Office	22.8	27.8	82.0 %	
Library	22.8	29.7	10.5 %	
60.07 Meeting room	12.7	27.6	0.0 %	
4C 09 Office	22.7	23.4	47.6 %	
4A.06 Meeting room			0.0 %	
4A.02 Meeting room	22,8	27.9	2.9 %	
4D 18 Meeting room	22.4	78.5	4.5 %	
Elevators and restrooms	22.4		10.6 %	1



A self-learning software solution that automatically optimizes climate conditions and energy usage in a building

- Digital Twin of the HVAC
- Improves comfort without any human intervention
- Minimal 15% energy savings

bGrid data and analytics adds additional data on the indoor environment and usage and

• Adds 10 – 20% additional savings





bGrid's Background

bGrid Credentials

>300.000m² office space

buildings in EU and USA

>30 office

>30.000 nodes >300 million operating hours

2.81

ALC: NO

bGrid building data for all





The three take-aways:

1. Forget the Silo's – the build environment is rapidly becoming an ecosystem of niche providers, combine strengths!

2. Evolving – the World deserves better buildings! Tomorrow is unknown today, buildings need to evolve also in between major renovations.

3. Less is the new more – simply open-up the infrastructure



Thank you!