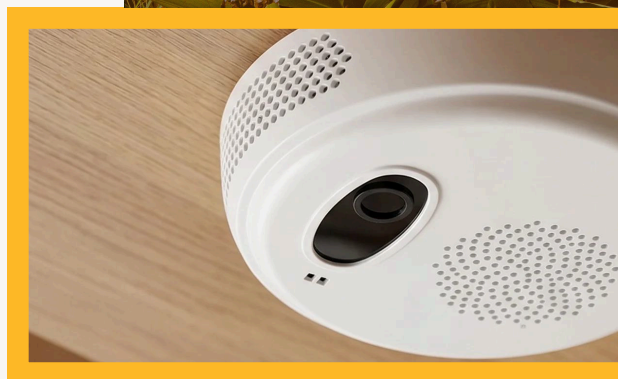
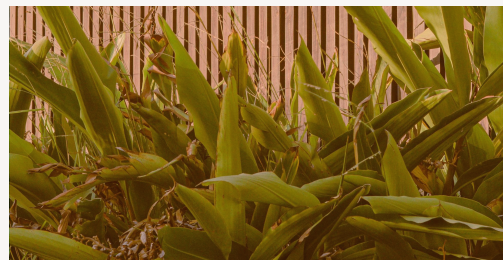




Continuous monitoring to optimize space efficiency

Whitepaper 5 of 6



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Smart campus expert



Introduction

In the previous whitepaper, we showed you how to build a business case based on information from a space usage report.

Now we'll take you through the final step: how to set up monitoring to continuously improve space utilization. If you truly want to make your space usage more efficient, this is perhaps the most important step!



Key takeaways

1

By involving schedulers in determining interventions, you choose the right intervention and achieve the desired effect on space usage.

2

It is better to determine the (annual) effect of all interventions on space usage than to measure the effect of a single intervention. A practical case shows a 20% efficiency gain on an entire program.

3

With adaptive scheduling, you can increase actual occupancy and utilization above 75%; at least 5-10% efficiency gains are possible.

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Tip 1: Involve schedulers in determining an intervention

Our first tip is to involve the schedulers in order to consider the expected effect on occupancy and utilization when determining an intervention, such as divesting a building. The reason for this is that, at a high level of abstraction, it's impossible to say whether an intervention will translate into a higher or lower frequency or occupancy rate. And if you don't know that, you might choose an intervention that will actually cause problems.

We will use an example to demonstrate how an intervention can lead to an increased frequency rate, occupancy rate, or both. The figure on the next page shows a schematic model of educational needs. The number of classes that must be scheduled is determined by the number of education programs, their curricula and the desired teaching formats. Because the class size for each education program is 100 students, the groups for tutorials and project groups must be split to provide small-scale teaching. This demand is then scheduled in the various room types.

Teaching space demand of an Institution

(simplified example)

Current situation

	10.000	students	
	10	education programs	
	100	courses (10 per program)	
	teaching format per course		
lecture		tutorial	group project
40 courses	30 courses	30 courses	
	demand per week		
4 hours/week	4 hours/week	8 hours/week	
1 lecture hall	2 classrooms	10 meeting rooms	
100 students	50 students	10 students	

Increase to 12.000 students

	12.000	students	
	10	education programs	
	100	courses (10 per program)	
	teaching format per course		
lecture		tutorial	group project
40 courses	30 courses	30 courses	
	demand per week		
4 hours/week	4 hours/week	8 hours/week	
1 lecture hall	3 classrooms	12 meeting rooms	
120 students	40 students	10 students	

The next step is to show how student growth affects these ratios. The number of education programs, the courses within them, and the contact hours do not change as the institution grows. What does change is the group size. This can lead to both higher frequency and occupancy rates.

As shown in the figure, for lecture halls, this translates into higher occupancy rates: the demand for rooms does not increase, but the group size does. For meeting rooms, this translates into higher frequency rates: the group size does not increase, but the number of rooms requested does. For instruction rooms, this affects both the number of rooms requested and the group size.

These kinds of analyses can be effectively conducted by collaborating with scheduling teams. Based on their knowledge and experience, they can indicate the expected effects of, for example, reducing the number of classrooms or changing the scheduled hours. Based on the expected group sizes, scheduled classes, classrooms, and room sizes, analyses can be conducted that reveal surpluses and shortages, and the expected effects of an intervention.

Growth or shrinkage of an institution can affect both frequency and occupancy rates. As an Estates manager, collaborate with scheduling specialists to determine the right intervention and gradually become more efficient in your space usage.

Tip 2: View efficiency gains as a whole and not per intervention

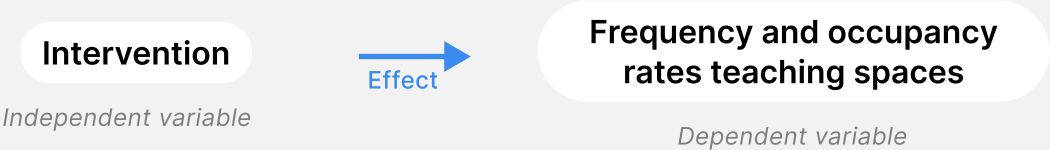
This brings us to the second tip. Determining and subsequently evaluating the efficiency gains of an intervention isn't as simple as it might seem. This is because an intervention isn't the only factor influencing space utilization: it doesn't occur in a vacuum. Whether the intervention is in real estate, educational logistics, or measuring space utilization, other factors will change simultaneously: student numbers, the distribution of students into student groups, educational programs, and so on. This makes attributing the measured effect (increased frequency and/or occupancy rates) to a single intervention very difficult.

Alternatively, you can choose the following approach: view all efforts together, and determine the annual efficiency gain compared to the baseline year. This approach was followed at TU Delft; annual measurements were used to determine whether interventions were necessary, resulting in a 20% reduction in capacity per student over time [1]. Ultimately, the efficiency gain is best measured by the change in frequency and occupancy rates. And normally, the ratio of teaching space capacity (seats) to students will follow a similar trend.

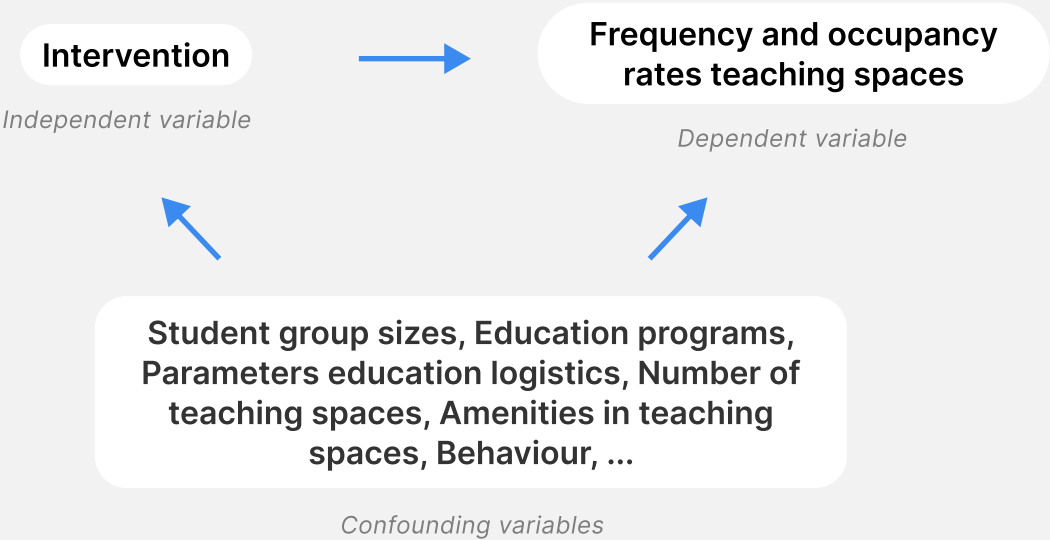
[1] Valks, B. (2021) Smart campus tools. Technologies to support campus users and campus managers. Delft: TU Delft. PP. 164-166.

The relationship between interventions and space use

SIMPLE VIEW



REALISTIC VIEW



Efficiency gains are the percentage improvement in frequency and occupancy rates compared to a baseline measurement, resulting from a program of interventions. A case study shows that a 20% efficiency gain is achievable.

Tip 3: Increase space efficiency further with adaptive scheduling

It is possible to achieve a scheduled frequency and occupancy rate of approximately 75% with a combination of real estate and educational logistics interventions, such as optimizing scheduling hours, implementing registration for classes, and so on. However, this does not guarantee that actual frequency and occupancy rates will also reach 75%. To use classrooms even more efficiently, the scheduling process needs to be improved. This concept is called adaptive scheduling [2].

With adaptive scheduling, you can adjust your schedule based on real-time data. This can help you achieve at least 5-10% efficiency gains and exceed 75% frequency and occupancy rates!

[2] Oude Vrielink, R.A. (2025) Improving the quality of classroom allocation in higher education. Towards the efficient and effective use of space. Twente: University of Twente. P. 93

Adaptive scheduling is about adjusting the schedule throughout the academic year based on changing circumstances. Because sensors now continuously measure space usage, this information can be used in the scheduling process. The scheduler is provided with information about the frequency and occupancy rates of an activity in a room or a collection of lessons for a single subject.

- This allows the scheduler to see the following:
- 1. How many of the reservations made were actually used;
 - 2. What was the maximum number of students present;
 - 3. What the decline in student attendance was during the course.

Each of these insights can be linked to an action. Based on insight 1, the scheduler can choose, in consultation with the responsible teacher, to remove a current series of reservations from the schedule if they are not being used, or they can take this into account when determining the needs for the following year's schedule.

Insights 2 and 3 can be used to move the activity for the following weeks to a smaller room, or to include it in the following year's schedule. Overbooking can also be allowed: a course may then be scheduled in a room smaller than the class size, because the average attendance has been shown to allow this.

The frequency and occupancy of one lesson in one teaching space

☐ Lesson ID	☐ Attendance	Location	Time	Faculty	Status	Attended	Capacity
☐ Hoorcollege 1 Statistiek 1	24%	Zaal A Gebouw A	09:00 - 10:45 Mon Sep 01, 2025	TW	Completed	33 / 139	145

Overview of the planned lessons for one course

Filtered Lessons

8 / 1591

Under-attended

5

No-Show

1

Completed with occupancy > reservation size: 1448

Total completed lessons: 1591

Total lessons: 1591

View

☐ Lesson ID	☐ Attendance	Location	Time	Faculty	Status	Attended	Capacity
☐ Hoorcollege 1 Statistiek 1	24%	Zaal A Gebouw A	09:00 - 10:45 Mon Sep 01, 2025	TW	Completed	33 / 139	145
☐ Hoorcollege 1 Statistiek 1	70%	Zaal C Gebouw C	17:00 - 18:45 Mon Sep 08, 2025	TW	Completed	97 / 139	139
☐ Hoorcollege 1 Statistiek 1		Zaal C Gebouw C	17:00 - 18:45 Mon Sep 15, 2025	TW	Completed	- / 139	139
☐ Hoorcollege 1 Statistiek 1	30%	Zaal C Gebouw C	17:00 - 18:45 Mon Sep 22, 2025	TW	Completed	42 / 139	139
☐ Hoorcollege 1 Statistiek 1	1%	Zaal C Gebouw C	17:00 - 18:45 Mon Sep 29, 2025	TW	Completed	1 / 139	139

This approach gives the scheduler more opportunities to positively influence the match between demand for rooms and available supply. A prerequisite, of course, is that the scheduler has sufficient authorization and there is support within the primary process for this approach.

No one yet knows exactly what actual occupancy and utilization rates are achievable with this approach. Wageningen University has already taken the first steps in this direction and estimated that they achieved 5-10 percent efficiency gains [3]. However, continuous improvement requires a system that can accurately record occupancy and utilization in real time. At Pleq, we are happy to work with institutions to find the optimal solution!



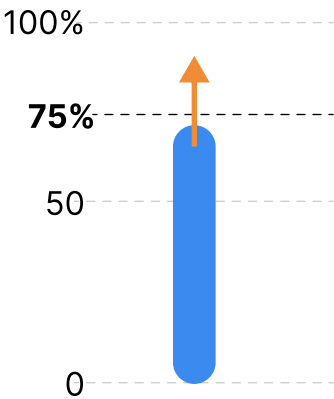
[3] Valks, B. (2021) Smart campus tools. Technologies to support campus users and campus managers. Delft: TU Delft. PP. 410-411.

Tip 4: Maximize the use of teaching spaces by leaving them open

A final way to maximize the use of classrooms during class hours is to open them and allow students and staff to use them when they're not scheduled. This can further increase the actual frequency rate. Of course, there are a few conditions attached, such as leaving the classroom on time and leaving it tidy and clean.

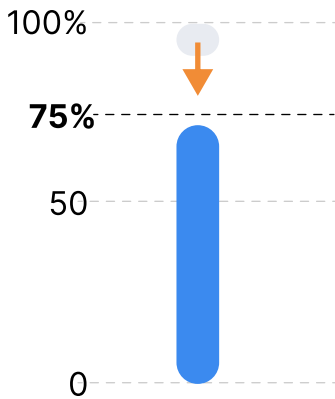
In the previous white paper, we indicated that scheduling should take a certain vacancy percentage into account. The more this vacancy is filled by unplanned use, the better. It's wise to address this separately in the reports, after reporting the frequency and occupancy rates resulting from scheduled classes.

Frequency rate



Optimizing planned use

Frequency rate

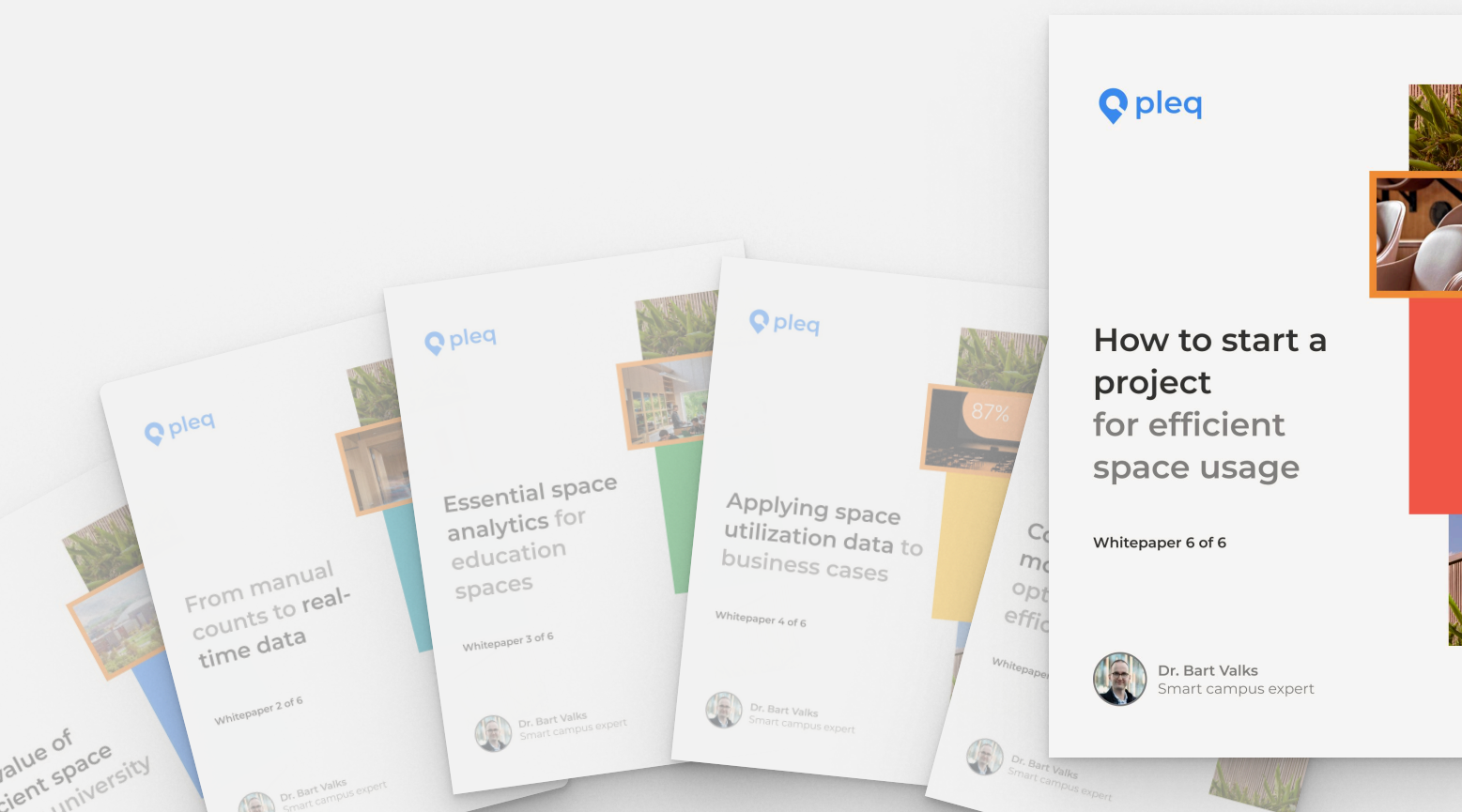


Stimulating unplanned use

Volgende whitepaper

How to start a project for efficient space usage

In this fifth white paper, we've discussed how to predict and measure the effects of interventions, and how to further improve space utilization. In the sixth and final white paper, we'll discuss how to get started with our solution and take the first steps toward measuring frequency and occupancy rates for your portfolio!



Would you like to optimize your space use?
Call us and let's make a plan together.

Schedule an appointment



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Smart Campus Expert

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