

CONNECTIVITY, SERENDIPITY AND TRANSACTION SYSTEM



DOCUMENTATION

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CONTENTS

1	INTRODUCTION	2
1.1	Background	2
1.2	Scope.....	2
1.3	Branding & deployment options	2
2	BUSINESS PERSPECTIVE	3
2.1	Introduction.....	3
2.2	Overview of core system concepts.....	3
3	END-USER PERSPECTIVES.....	5
3.1	Introduction.....	5
3.2	Online customer booking a meeting space.....	6
3.3	Online customer booking a workspace	10
3.4	Optional plugin: Inspirational encounters facilitated by The Serendipity Machine	12
3.5	Online customer creating a tender for desk space	13
3.6	Location manager working with back office.....	15
3.7	Administrator using back office dashboard.....	18
3.8	Administrator setting prices, yield management and vouchers.....	24
4	SOFTWARE DEVELOPMENT PERSPECTIVE.....	28
4.1	Introduction.....	28
4.2	Application architecture.....	28
4.3	Development and testing process.....	30
4.4	Maintainability	30
4.5	Security	31
5	OPERATIONS PERSPECTIVE	32
5.1	Overview of deployment architecture	32
5.2	Infrastructure workload.....	32
6	APPENDIX 1: CORE CLASSES DATABASE SCHEMAS	33
6.1	Voucher.....	33
6.2	Cart.....	34
6.3	Profile.....	35
6.4	Location	36
6.5	Reservation.....	37

1 INTRODUCTION

1.1 Background

This report, commissioned by Cyberdigma B.V., is written and maintained by Stephan Verveen (FunnelVision).

The scope and depth of this report are such that the reader can quickly get an overall understanding of the system for location owners, as well as a more in-depth perspective on the application design, development and operations.

1.2 Scope

The system comprises a wide range of functionalities that serve the overall business ecosystem. The functionalities include amongst others an online Headquarter for location hosts, an online magazine and a plug-in that integrates seamlessly with a system to enable community features: The Serendipity Machine.

This document focuses on the booking functionality for meeting, desk and working spaces and briefly references The Serendipity Machine.

The functionality is described from four perspectives: business, end-user, software development and operations.

1.3 Branding & deployment options

Much of the screenshots and examples in this document draw from the implementation for Seats2Meet.com. These examples can be considered to be a reference implementation. The system and its channel functionality are available as a white-label (custom branded) offering.

A typical white-label implementation of the system is hosted on the Cyberdigma infrastructure as described in chapter 5.

Self-managed hosting is possible too; this requires supplemental agreements for managing support, maintenance and updates.

2 BUSINESS PERSPECTIVE

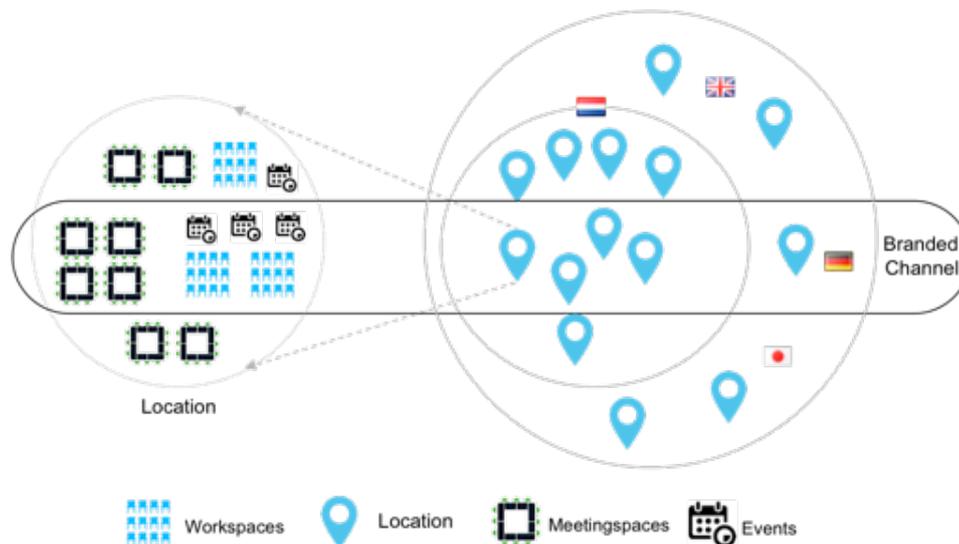
2.1 Introduction

For the business perspective an overview of core concepts is given with a description of how these are related.

The concepts in the next section constitute the foundation for the functionality of the Connectivity, Serendipity and Transaction System. The system is designed to support networked professionals that are in need of a workspace, a meeting space or a desk space.

2.2 Overview of core system concepts

This image shows how the core concepts of the Booking Functionality are related. The Branded Channel is the highest in the conceptual hierarchy.



In short, a **channel** provides access to one or more **countries** in which there are one or more **locations**. Locations have a **location manager**, have customer reviews and at least one or more **workspaces** and **meeting spaces**. The seating options of meeting spaces can be chosen from a given set of possibilities that are managed by the location manager. Workspaces can be booked both for money and **social capital**. Customers can host an **event** at the location and customers can **check-in** on the location or the event.

Below, a more detailed description is given of these concepts.

Channel

A channel is an online customer experience that is optimized to implement a specific marketing strategy. For all the other concepts that are related to the channel, conditions can be set specific to that channel such as countries, supported languages, locations, seat capacity, pricing, open hours, etc.

Country

A country has a language and a set of locations, the filtering of these depends on the active channel.

Location

A location is a physical space in a geography that provides one or more meeting spaces and/or one or more working spaces. Locations have one or more managers that control the (commercial) parameters for that location and the spaces in it.

Meeting space

A location (in a city) can have one or multiple meeting spaces. Meeting spaces are typically separate rooms that are booked for use by more than 1 person.

Workspace

A location (in a city) can offer one or multiple workspaces. Workspaces are booked on an individual basis and typically 'paid' for by Social Capital.

Office space

Some locations (in a city) can be contacted to rent office space for a range of days in a row, e.g. for project teams.

Events

At a location, events take place that attract visitors to the location. Event information can be published through a variety of channels.

Customer

A person creating a booking for a meeting space, workspace or office space.

Check-in

A person checking into a location to confirm his/her presence.

Social Capital

Social capital refers to the willingness of the customers to share their abundance of knowledge and network, and to be open to serendipitous encounters. Customers of workspaces are asked to communicate what they will be working on upon check in.

Location manager

A person with access to the back office application for one or multiple locations. The location manager can control all location details with regard to meeting spaces, working spaces, capacity, opening hours, pricing, commercial deals, etc.

Back office administrator

A person with full access to and permissions for all system data.

3 END-USER PERSPECTIVES

3.1 Introduction

This chapter describes scenarios of use for three types of user: the **Online customer** making a booking and two back office users: a **Location manager** and an **Administrator**.

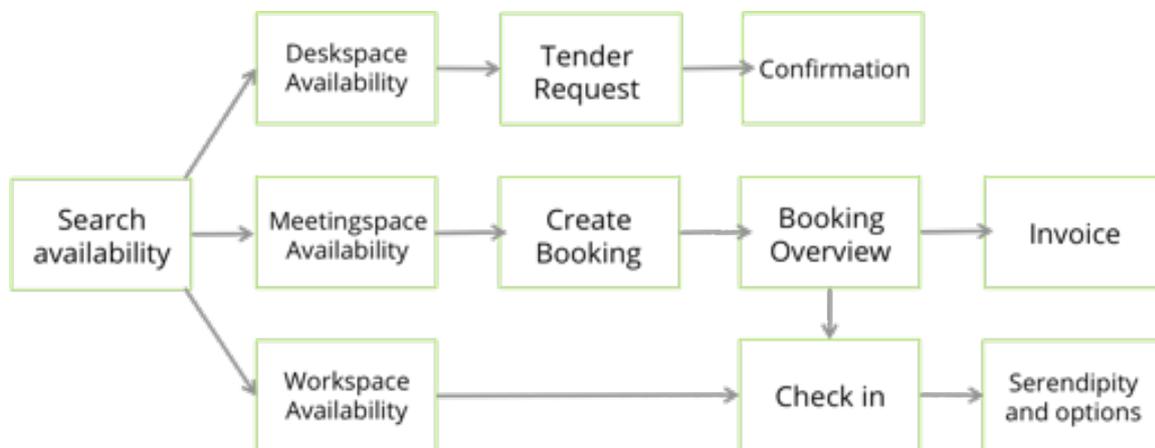
3.1.1 Scenarios of use for Online customer booking application

For Marketplace 1 (as described in the previous chapter), three main scenarios of use are covered:

The booking of a meeting space

The booking of a working space

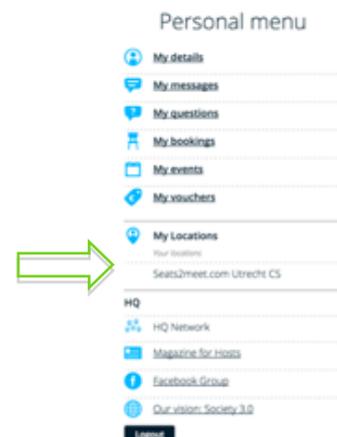
The booking of desk space



3.1.2 Back office applications

Two versions of the back office application are available. One is optimized for Location managers, the other provides quick access to in-depth features for Administrators (advanced users).

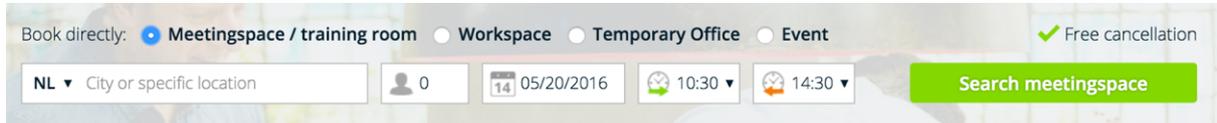
The back office is entered via the Personal menu that is available to users that are logged in. Depending on the settings for the location, either the Location manager version or the Administrator version is provided. Both versions are covered in more detail in the next section.



3.2 Online customer booking a meeting space

Meeting spaces typically are separate rooms at a location that are booked for use by more than 1 person. A location can have multiple meeting spaces.

3.2.1 Check availability



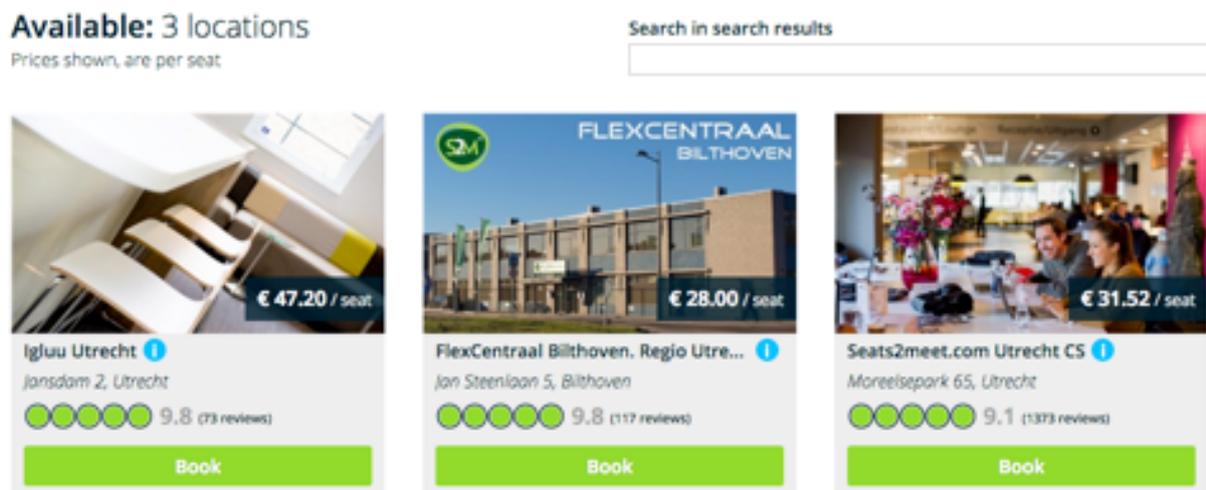
Book directly: Meetingspace / training room Workspace Temporary Office Event ✔ Free cancellation

NL ▾ City or specific location 0 14 05/20/2016 10:30 ▾ 14:30 ▾

The available meeting spaces can be searched by specifying a city or a directly a specific location, the number of seats needed, the date and the start and end times of the meeting.

The search defaults to the country from which the user is visiting the website, but can be overridden by selecting an alternative country.

3.2.2 Select available location



Available: 3 locations
Prices shown, are per seat

Search in search results

Location	Price per seat	Address	Reviews
Igloo Utrecht	€ 47.20 / seat	Jansdam 2, Utrecht	9.8 (73 reviews)
FlexCentraal Bilthoven. Regio Utre...	€ 28.00 / seat	Jan Steenlaan 5, Bilthoven	9.8 (117 reviews)
Seats2meet.com Utrecht CS	€ 31.52 / seat	Moreelsepark 65, Utrecht	9.1 (1373 reviews)

The search leads to an overview of the locations with availability for the specified number of seats on the given date and time. For each available location, a price per seat, address details and customer review scores are shown.

3.2.3 Select available space and options at a location

1
 Search

2
 Options

3
 Data

4
 Confirmation



Do you want to change your meetingspace? [Change meetingspace](#)

May I introduce myself? I am Nynke Visser. Thank you for booking at Seats2meet.com Utrecht CS. Let me know if I can help you with anything!

030 2393838

My booking

Date: 5/30/2016
 Location: Seats2meet.com Utrecht CS*

Meetingspace: Some Like It Hot (8)
 Time: 09:00 - 17:00
 Setting: Meeting
 Seats: 10

Price per seat € 33.77

10x Some Like It Hot (8) (€33.77)	€ 337.70
10x Coffee, tea and water	€ 100.00
Total excl. tax:	€ 437.70
Total 6%	€ 6.00
Total 21%	€ 66.19
Total incl. tax:	€ 514.62

Go to next step

* Trade name: Seats2meet.com BV
 CoC number: 30187469
 V.A.T. number: 8176.79.273.B.01

Options

▼ Food & Beverage

Amount		Option price	Total price
<input checked="" type="checkbox"/> 10 x	Coffee, tea and water	€ 10.00	€ 100
<input type="checkbox"/> 10 x	Cookies	€ 2.50	€ 0
<input type="checkbox"/> 10 x	Eenvoudig ontbijt	€ 6.00	€ 0
<input type="checkbox"/> 10 x	Fruit	€ 2.75	€ 0
<input type="checkbox"/> 10 x	Koude borrelhapjes	€ 6.50	€ 0
<input type="checkbox"/> 10 x	Lunch @ your meetingspace	€ 19.50	€ 0
<input type="checkbox"/> 10 x	Lunch buffet (tussen 12:00 en 13:00)	€ 18.50	€ 0
<input type="checkbox"/> 10 x	Networking drinks	€ 7.50	€ 0
<input type="checkbox"/> 10 x	Sandwiches, milk and juice	€ 12.50	€ 0
<input type="checkbox"/> 10 x	soda	€ 4.50	€ 0
<input type="checkbox"/> 10 x	Sweet temptation	€ 4.50	€ 0
<input type="checkbox"/> 10 x	Upgrade Premium Coffee from our Espresso bar	€ 7.50	€ 0
<input type="checkbox"/> 1 x	Vegetarische borrelhapjes	€ 6.50	€ 0
<input type="checkbox"/> 10 x	Warm snacks	€ 6.50	€ 0
<input type="checkbox"/> 10 x	Yoghurtsnack	€ 3.00	€ 0

▶ Audiovisual equipment

▶ Other

After selecting a location, a specific meeting space at that location is suggested. Here, the customer can select an alternative meeting space, the desired seating configuration and specify options such as Food & beverages and Audiovisual equipment. The booking details are updated with each change made by the customer.

3.2.4 (Social) login / Account registration



Log in

Email address

Password

[Forgot your password?](#)

Or log in with [via log in link request](#)

Don't you have an profile yet? [Register here](#)

Customers are prompted to log in with an existing account, create a new account or log in with a social media identity. A recently added option is to request a link to be sent to your email address, which will allow you to log in directly.

3.2.5 Complete billing details



Selected company

Send invoice to

Attn*

Invoice e-mail*

PO number

Address

Postal code

City

Phone*

Name of your meeting

Please enter the name of your meeting. By entering a name for your meeting it becomes more easy to find your booking, when you have made multiple bookings.

There are 36 characters left

Add tags that summarize your meeting

My booking

Date: 5/25/2016
Location: Meeting Plaza Utrecht*

Meetingspace: 211
Time: 09:00 - 17:00
Setting: Examination
Seats: 10

Price per seat € 29,71

10x	211 (€29.71)	€ 297.10
10x	Coffee, tea and water (unlimited)	€ 150.00
10x	Gebruik van de aanwezige kennis via http://s2m.to/meetingplaza030/social	€ 0.00

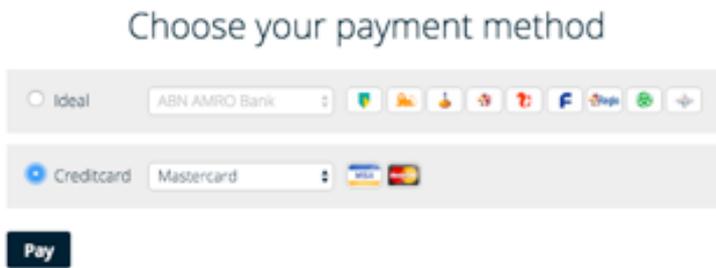
Total excl. tax: € 447.10
Total 6%: € 9.00
Total 21%: € 62.39
Total incl. tax: € 518.49

Voucher

Additional info: In addition, we ask you to fill in your booking details. If you do not succeed, please let me know!

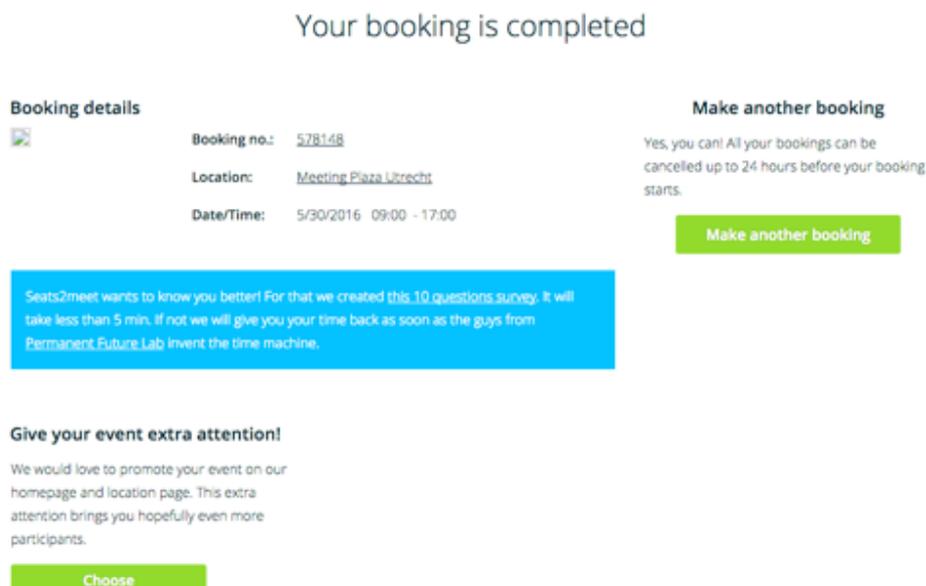
The customer is prompted to specify the address details for the invoice. If already available for this account, this information is prefilled in the form.

3.2.6 Online payment



A bank transaction via Ideal or Credit card payment can be made, which is processed by Icpay (external payment provider).

3.2.7 Booking confirmation



Upon completing the payment, a booking confirmation is presented. Note that an event that takes place at the location can be published to a public calendar to attract more attention.

3.2.8 Publishing event information

Upon completing the booking, information about the event can be published to the public calendar for that location. A title, description, URL and tags can be entered.

The image shows two parts of the interface. On the left is the 'Give your event extra attention!' form. It includes a 'Name' field with 'My Special Event', a 'Description' field with 'Events can be published on the public calendar.', time selection fields for 11:00 and 19:00, a 'My event url is:' field with 'http://www.myspecialevent.com', and a 'Tags' section with 'cocreation', 'serendipity', and 'society30'. A green 'Publish on calendar' button is at the bottom. On the right is the 'SEATS2MEET.COM EVENT CALENDAR' page. It features a search bar with '1 event found', a date filter for '07/18/2016', and a search button. Below, it shows 'Monday, July 18, 2016' and a card for 'My Special Event' with a location pin for 'Seats2meet.com Utrecht CS - Utrecht' and a 'See more' button.

The event information is published to the event calendar.

3.3 Online customer booking a workspace

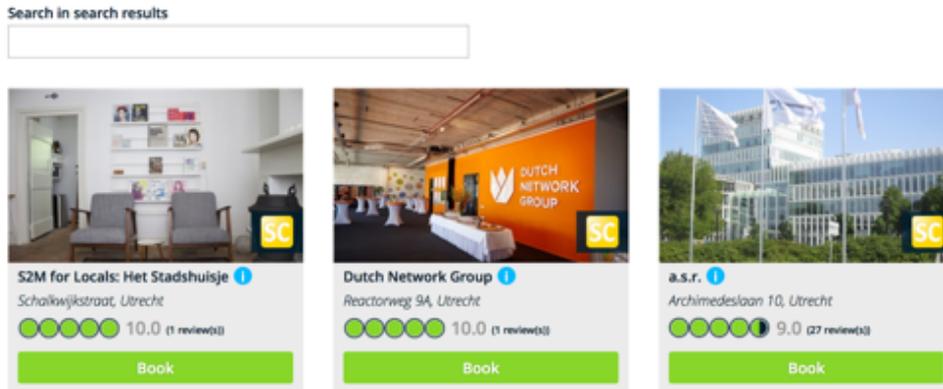
Workspace bookings are made on an individual basis only. If available, customers are checked in automatically to the location of their choice.

3.3.1 Workspace availability search

The image shows the workspace availability search interface. At the top, there are radio buttons for 'Meetingspace / training room', 'Workspace' (which is selected), and 'Temporary Office'. To the right is a checkmark and the text 'Receive best matches'. Below this is a search bar with 'NL' and 'Utrecht', a date field for '07/28/2016', and time selection fields for '9:00' and '17:00'. A green 'Search workspace' button is to the right. A dropdown menu is open below the search bar, listing 'All locations in Utrecht', 'Igluu Utrecht', 'a.s.r.', 'Cyberdigma.lab', 'Meeting Plaza Utrecht', and 'Eureka! Foundation'. There is also a 'Search in' field below the dropdown.

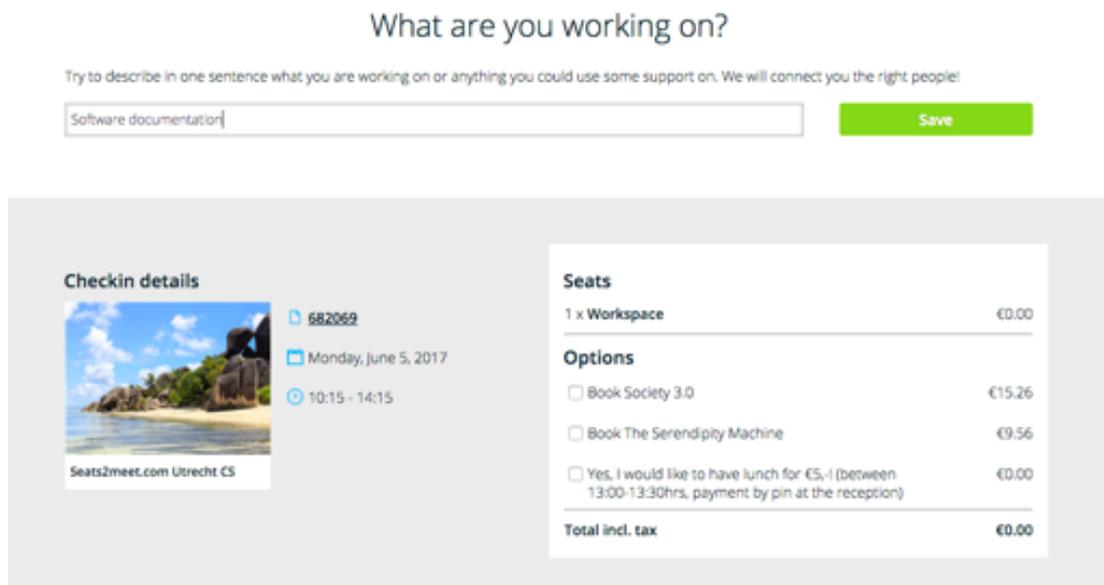
After selecting the 'Workspace' option, the customer can specify a city or location, a date and start and stop times for the booking.

3.3.2 Selection from search results



Based on the specified criteria, workspace availability is displayed. Note the  icons, which indicate that the workspaces can be used in exchange of 'Social Capital' and do not require a financial transaction.

3.3.3 Adding options and Serendipity information after booking

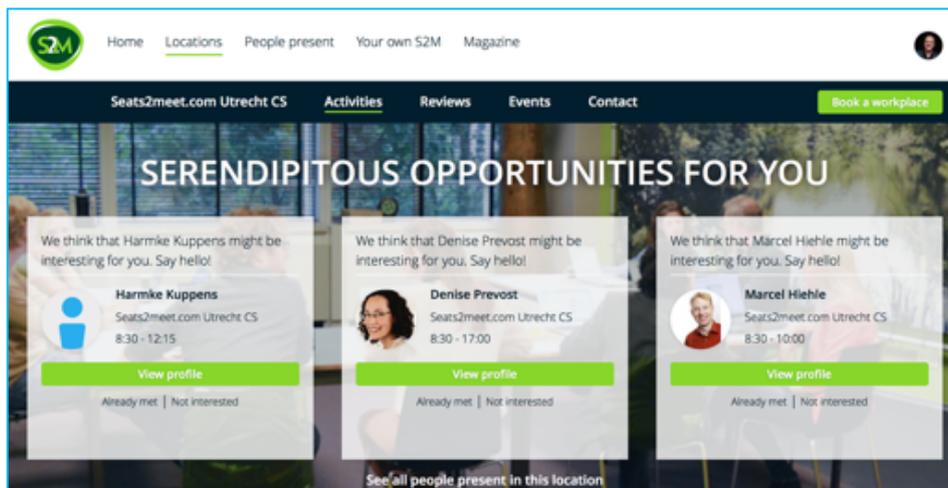


After the selection of the workspace, the customer is checked in automatically and presented with the question above. The information provided here is used to promote the exchange of social capital and serendipity via The Serendipity Machine.

Depending on the configuration of the selected location, the customer can select additional options that may require payment. The customer can enter a voucher code to obtain benefits associated with that voucher. For an impression of the possibilities for setting up a voucher, see section 3.9.4.

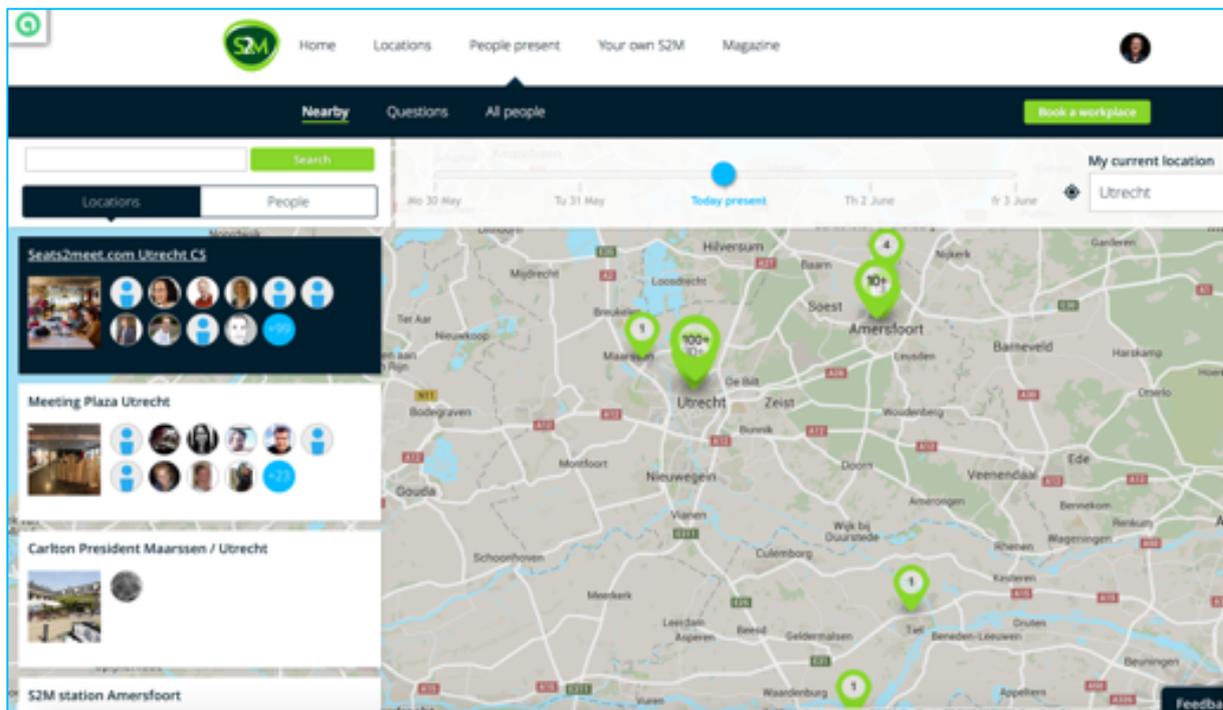


3.4 Optional plugin: Inspirational encounters facilitated by The Serendipity Machine



The 'Serendipity Machine' is an optional plug-in that runs a learning matching algorithm. The algorithm matches users on the system and offers suggestions for inspirational encounters.

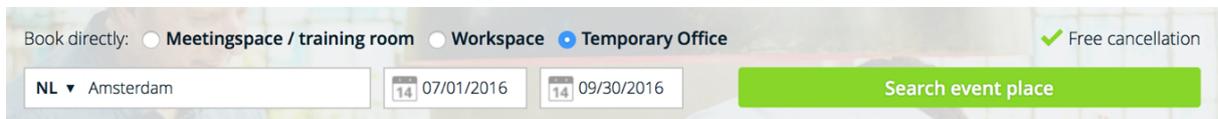
A real time virtual dashboard shows the people present at a location, including the knowledge and expertise they decide to communicate to the network. This way co-working and meeting other people becomes unexpectedly relevant, useful and a new way to connect, collaborate and grow, serendipitously.



3.5 Online customer creating a tender for desk space

For booking desk space for more than one day, Customers can create a tender request that is processed on a case-by-case basis by back office personnel.

3.5.1 Desk space availability search

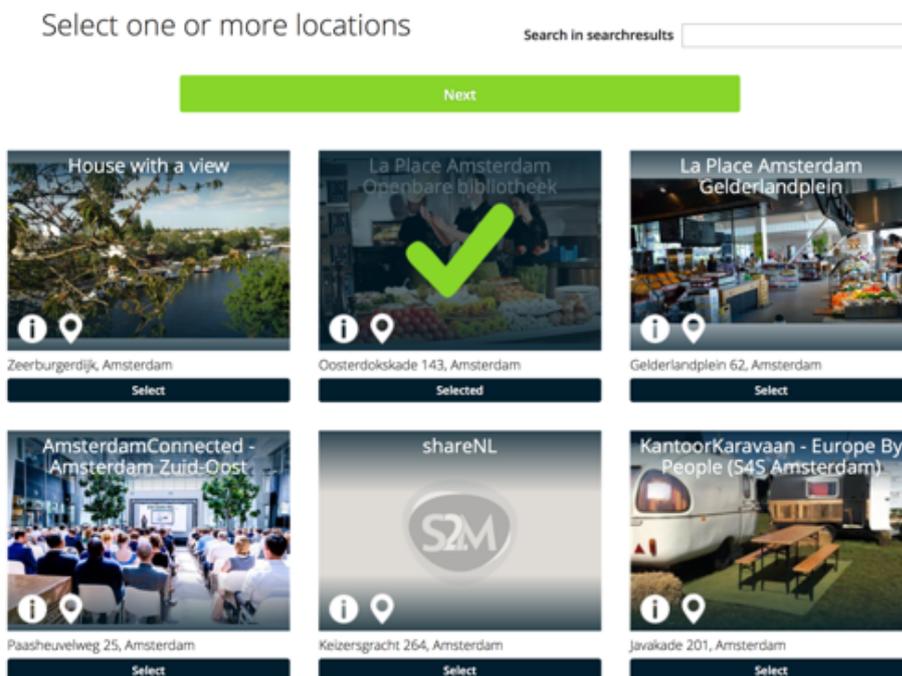


Book directly: Meetingspace / training room Workspace Temporary Office ✔ Free cancellation

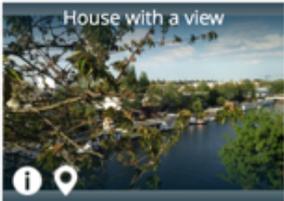
NL ▾ Amsterdam 07/01/2016 09/30/2016

The known locations can be searched by specifying a city or a specific location in a city.

3.5.2 Selection from search results



Select one or more locations

 <p>House with a view Zeerburgerdijk, Amsterdam <input type="button" value="Select"/></p>	 <p>La Place Amsterdam Openbare bibliotheek Oosterdokskade 143, Amsterdam <input checked="" type="button" value="Selected"/></p>	 <p>La Place Amsterdam Gelderlandplein Gelderlandplein 62, Amsterdam <input type="button" value="Select"/></p>
 <p>AmsterdamConnected - Amsterdam Zuid-Oost Paasheuvelweg 25, Amsterdam <input type="button" value="Select"/></p>	 <p>shareNL Keizersgracht 264, Amsterdam <input type="button" value="Select"/></p>	 <p>KantoorKaravaan - Europe By People (S4S Amsterdam) Javakade 201, Amsterdam <input type="button" value="Select"/></p>

The customer selects a location from the available locations.

3.5.3 Complete tender request details



TENDER REQUEST FOR A DESKSPACE AT SEATS2MEET.COM

Personal data	Special requirements
Firstname <input type="text"/>	Please let us know if you have any specific wishes with regards to your Deskspace. This will enable us to send you an offer that really matches your needs! <input type="text"/>
Lastname <input type="text"/>	
E-mail <input type="text"/>	
Phone number <input type="text"/>	
Company name <input type="text"/>	
<input type="button" value="Next"/>	

The customer can fill out a short form to specify the wishes for the desk space.

3.5.4 Desk space tender request confirmation

Confirmation

Thank you for DeskSpace request via Seats2meet.com. Within 24 hours you will receive a personal offer from the selected location(s).

We would like to refer you to a number of app's that can help to enrich your Did you for example thought of using the Seats2meet.com Event software to make your events more successful? And have you already considered using Meetin.gs to make your meetings more efficient?

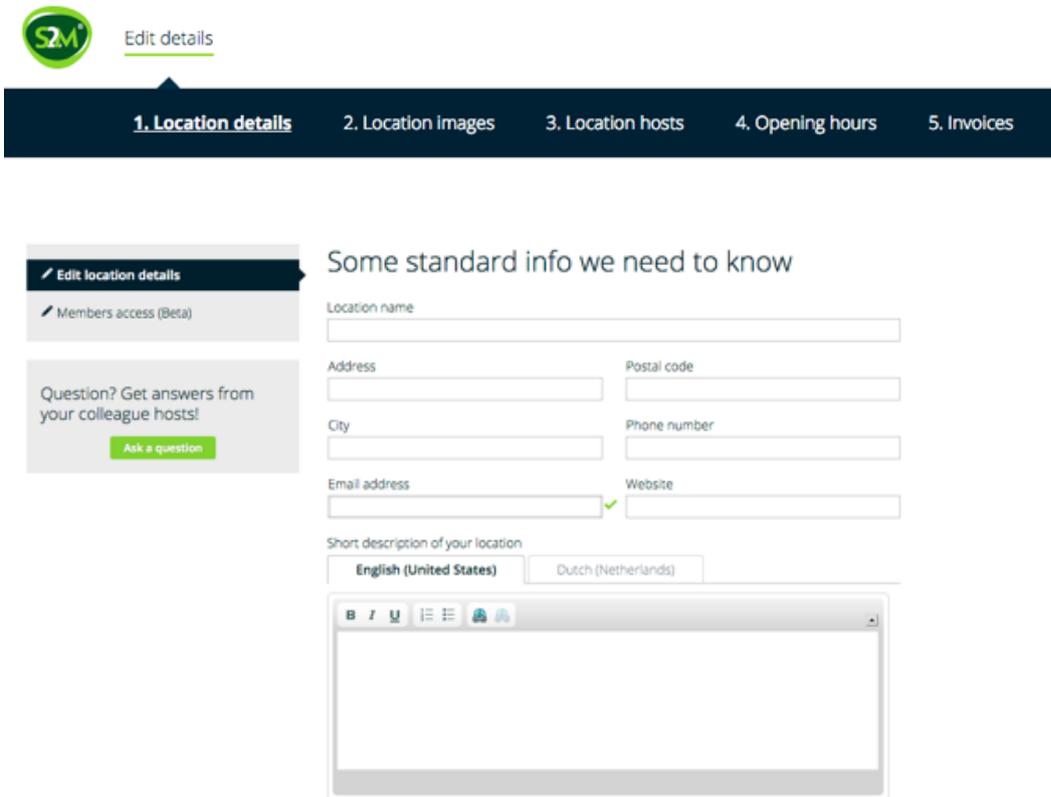


After sending the tender request, the customer is presented a confirmation screen.

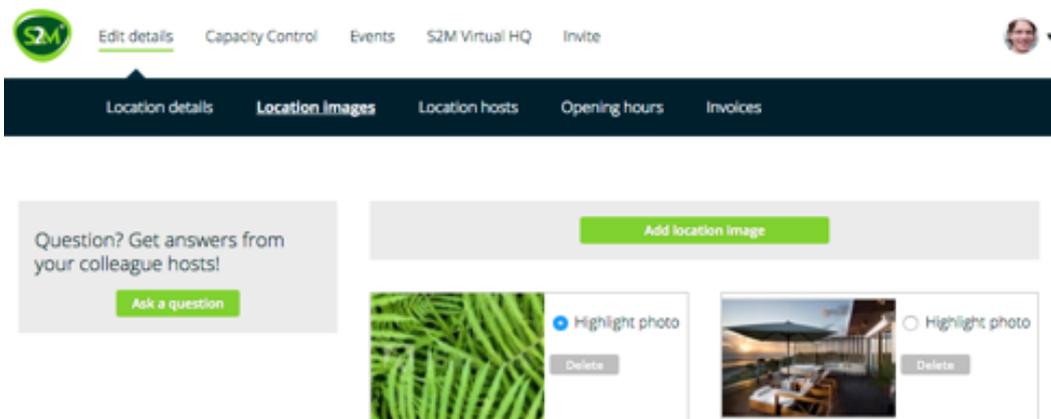
3.6 Location manager working with back office

This scenario of use refers to Marketplace 2 as described in chapter 2. A location manager can use the basic back office application, which provides easy access to all needed information for the location and the workspace(s) in it.

3.6.1 Basic location information



3.6.2 Location images



3.6.3 Location hosts information

Location details Location Images **Location hosts** Opening hours Invoices

+ Add host

Stephan Verveen

Edit

Question? Get answers from your colleague hosts!

Ask an expert

Add personal photo

Name

Email

Phone

Twitter handle

Save

A location can have one or multiple hosts.

3.6.4 Location opening hours

Location details Location Images Location hosts **Opening hours** Invoices

When is your location open?

	Open	From	Until
Sunday	<input type="checkbox"/>	08:00	18:00
Monday	<input checked="" type="checkbox"/>	08:00	18:00
Tuesday	<input checked="" type="checkbox"/>	08:00	18:00
Wednesday	<input checked="" type="checkbox"/>	08:00	18:00
Thursday	<input checked="" type="checkbox"/>	08:00	18:00
Friday	<input checked="" type="checkbox"/>	08:00	18:00
Saturday	<input type="checkbox"/>	08:00	18:00

Save

Default

Exceptions

Question? Get answers from your colleague hosts!

Ask an expert

Default opening hours can be easily entered and specific exceptions (e.g. for the holidays) can be made.

3.6.5 Setting up a workspace and capacity

+ Add workspace

Workspace nr 1

Ibiza

Edit workspace

Capacity per day

Question? Get answers from your colleague hosts!

Ask an expert

Choose image

Internal name

Ibiza

You can choose to work with capacity control or not. If you switch 'unlimited capacity' on everybody can checkin to your location. If you switch it off you can maximize the amount of workspaces which means people are actually booking a seat.

Unlimited capacity

Default capacity

10

Dutch (Netherlands) English (United States)

Public name

Short description of the workspace

Save

For each workspace at a location, a picture, capacity, a public name and a description can be entered.

3.6.6 Creating events at a location

Edit details Capacity Control Events S2M Virtual HQ Invite

+ Create new event

Question? Get answers from your colleague hosts!

Ask an expert

Name

Description

06/20/2016 8:00 18:00

My event url is: http://

Tags

Add

Save Cancel

Location managers can enter event information that becomes available to customers that view the location with the booking software.

3.6.7 Control over notifications



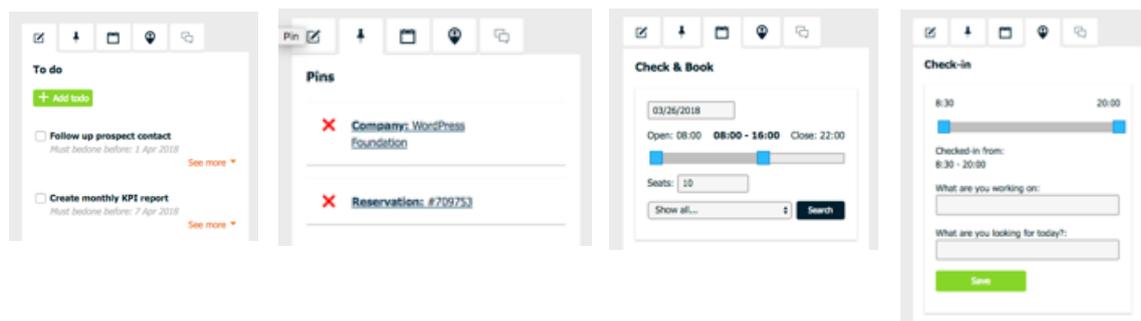
Location managers and administrators have detailed control over which notifications they receive. They can construct a set of rules that ensures that they receive notifications of events that are of interest to them only.

3.7 Administrator using back office dashboard

Administrators that have access to the back office dashboard have a single screen with direct access to all the information of the locations that are available for their account.

In addition to the menus that are available to the administrators, the functionality for setting seat prices, yield management and voucher is described in more detail.

3.7.1 Tabbed personal productivity panel



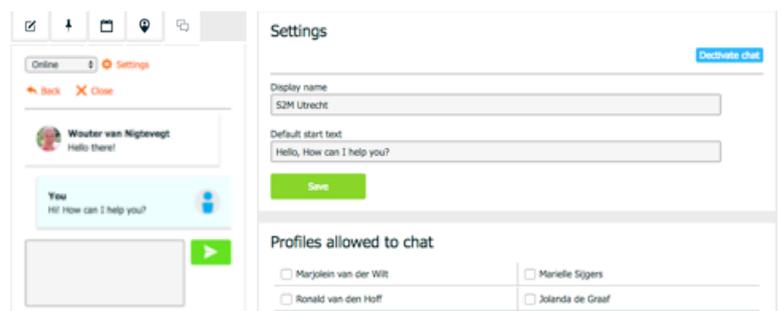
On the main administrator screen there is a tabbed column on the left of the screen that provides quick access to functions, bookings and customers that are referenced frequently.

On the *first* tab, location managers can keep track of To Do items and assign these to colleagues if necessary. The *second* tab provides quick access to bookings, companies and other items that have been 'pinned'. This pinning function, as depicted on the right in  [Pin](#)  [Edit](#), is available in many areas of the back office application.

The *third* tab 'Check & Book', allows for rapid entry of a new booking by the location manager. The *fourth* tab 'Check-in' allows the location manager to check in on this location, without occupying any capacity that is available for customers.

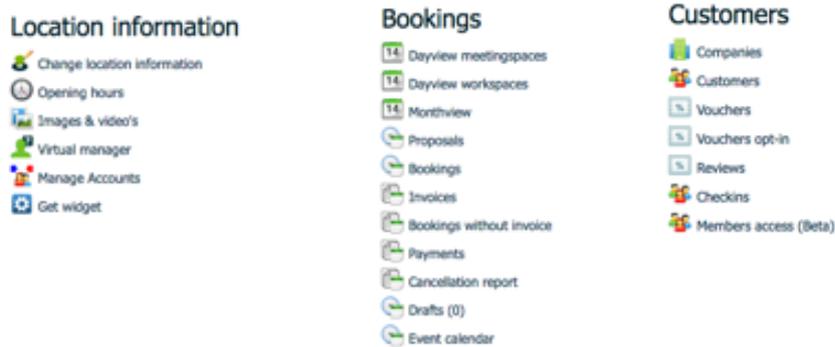
Finally, the *fifth* tab provides access to a chat window for direct communication between an online customer and a location manager.

The settings section of this function allows to set the displayed name presented to the customer and a default start text when the chat session is opened by the customer. Backoffice user profiles that require access to the chat function need to be selected here.



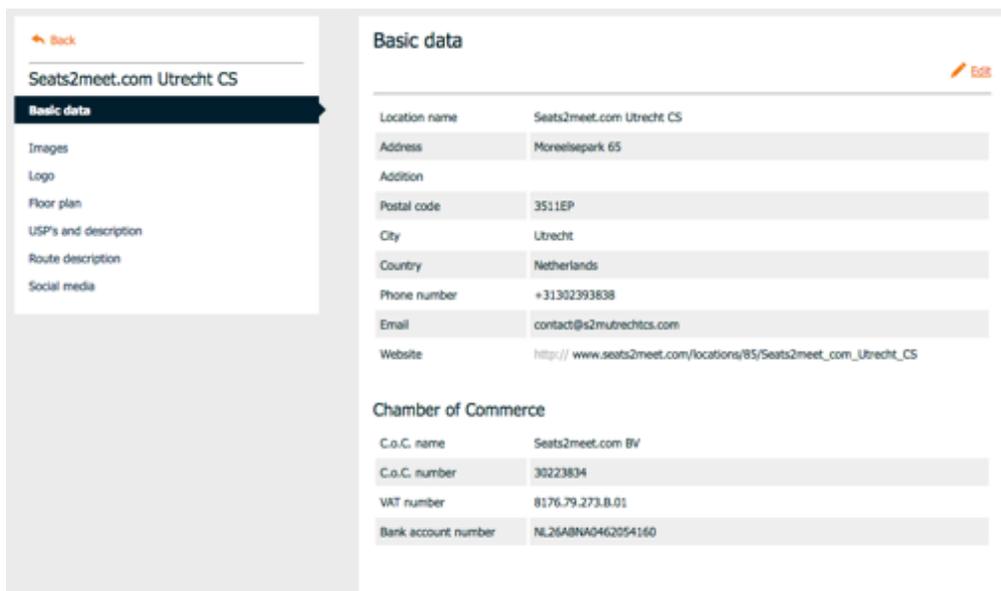
3.7.2 Direct access to Location Information, Bookings and Customers

All information related to managing a location can be accessed directly through a comprehensive menu.

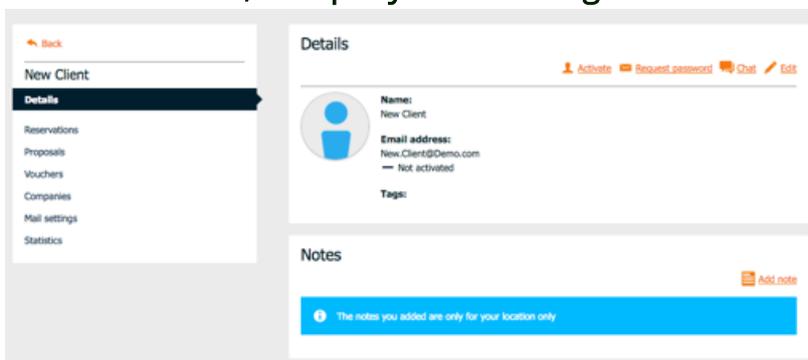


3.7.3 Managing Location Information

All key information about a location is managed in one place. This includes basic data such as contact details, VAT number, as well as location images, floorplan, route description and social media accounts.



3.7.4 Customer, Company and Booking Details



All client related details can be accessed via the client menu on the left. The client can be activated via a confirmation email sent to the client email address. This option can be checked when editing the client record.

Change date Copy reservation Revisions Send booking Print

Booking #696235
Meeting Plaza Utrecht
7 November 2017 9:00 - 17:00

Create quote

Edit reservation

Notes (0)
Check-ins (0)
Mail log
Event calendar

Save Cancel booking

Contacts

Name
Email
Phone

Add contact

Part of a serie booking

#696234 10/31/2017	#696235 11/7/2017	#696236 11/14/2017
#696237 11/21/2017	#696238 11/28/2017	

Tags

Has knowledge

Add tag

Invoice

Create deposito
Create Invoice

Booking details

Booker
Company
Name
Status
Language

Attn
Invoice e-mail
PO number
Address
Postal code
City
Phone

Seats	Description	Setting	Time	Price	Total
25	Sagrada Familia 217a	U-shape	9:00 - 17:00	17.5	437.50

Change time

Add meeting space

Subtotal: € 437.50

Options

Total people presents: 25

	Option price	Change in seats	Total price
Food & Beverage			
25 x limonades in karaffen met glazen en Tiny Tony chocolaatjes	€ 0		€ 0.00

Add options

Subtotal: € 0.00

Total excl: € 437.50
Total 21%: € 91.88
Total 6%: € 0.00
Total incl: € 529.38

Payment

Outstanding amount: € 529.38

Add payment

The booking details page provides access to all details including payments and related bookings.

Booking #752466
Meeting Plaza Utrecht
4 December 2017 9:00 - 17:00

Create quote

Check-ins (0)

Invite your colleagues

Sent to:

Your message:

Send invite

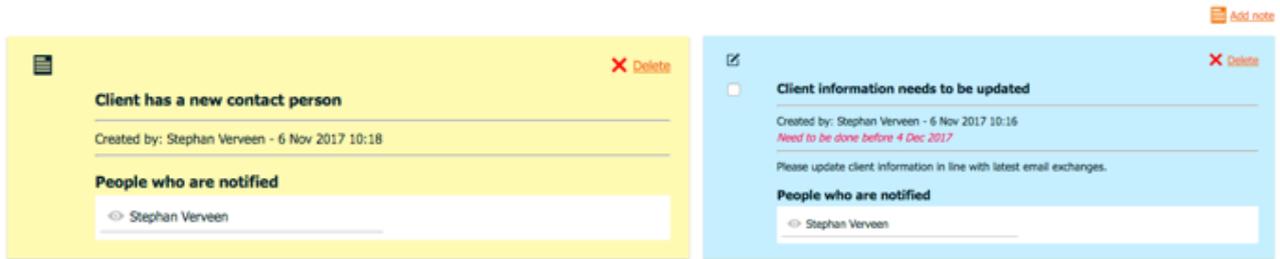
By selecting 'Check-ins' from the booking details page, the screen above is opened. From this screen it is possible for the administrator to add email address to invite meeting participants to check-in to the Seats2Meet ecosystem.

The company details page provides access to all related details.

3.7.5 Notes and ToDos

Several sections in the back office application allow the adding notes and todos to keep everyone in the organization up to date and aligned. These sections are: companies, accounts, vouchers, reservations, proposals and invoices.

A Note has a subject and a date from which it needs to be visible. It is optional to turn this Note into a ToDo. The ToDos show up in a tab on the main back office overview as described in 3.7.1

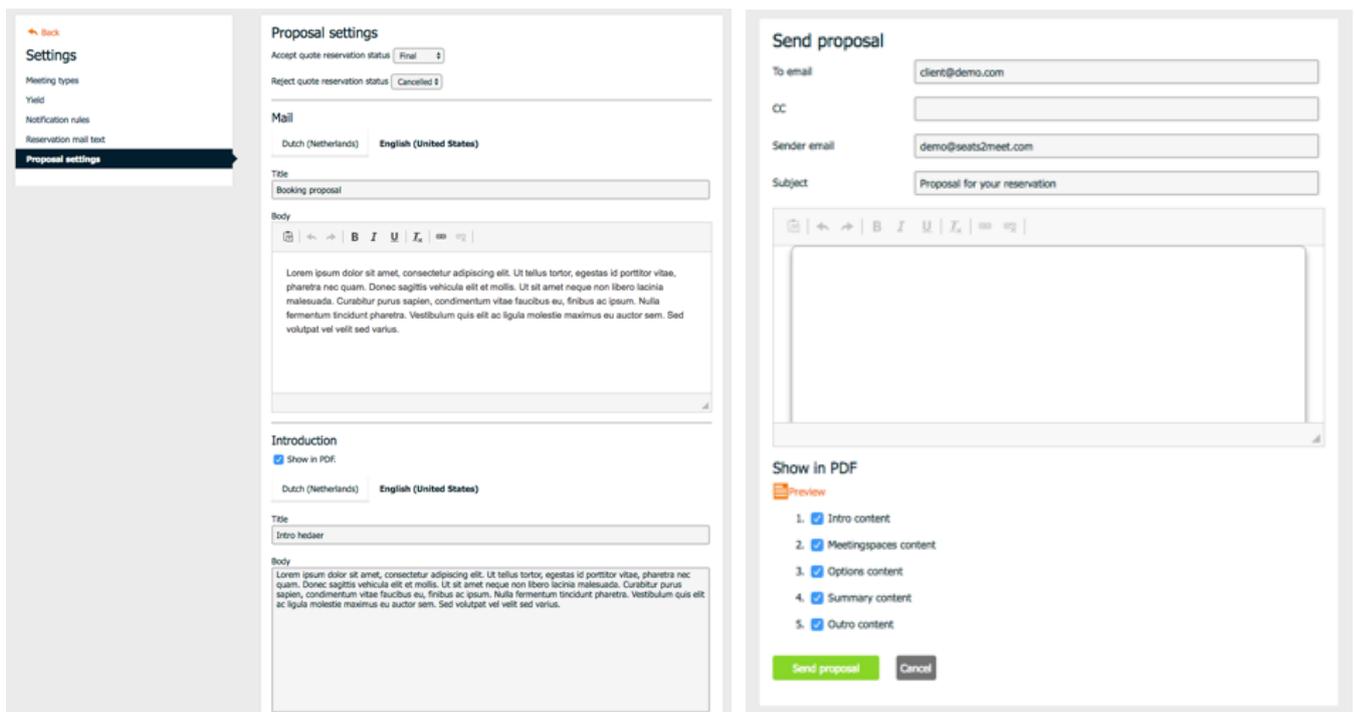


In each Note, there is a list of all people that are notified. In this list, it is possible to monitor who has seen the Note.



For Notes and ToDos, colleagues can be selected to receive a notification.

3.7.6 Creating and sending a proposal



A proposal is a booking with a status 'pending' and appears in the list of bookings with this status. A proposal can be sent to a prospect customer as a PDF attachment. The screens above show which content elements can be configured and integrated into the PDF and proposal email.

When the prospect customer replies 'rejected' or 'accepted', the status of the booking is updated accordingly. The appropriate status updates can be configured in the proposal settings.

3.8 Administrator setting prices, yield management and vouchers

3.8.1 Administrator setting base seat prices

The seat prices that are communicated to online customers on any given moment are based on the combination of a number of settings.

Below, you see the screens that are used to determine these settings.

Firstly, a base seat price is defined for each hour of the day for the whole location, regardless of the specific meeting room.

Hour	Price
1	€ 12.50
2	€ 7.00
3	€ 6.00
4	€ 2.50
5	€ 5.00
6	€ 3.00
7	€ 2.00
8	€ 6.00

Total price €46.00

[Add hour](#) [Delete hour](#) [Save](#)

The base seat price is calculated by adding the prices per hour, for each hour of the booking period.

3.8.2 Administrator applying Yield management rules to seat prices

In addition to the base seat prices per hour for the whole location, an administrator can specify a discount or surcharge percentage for each weekday as a general rule.

Day	Fee on standard seatsprice
Monday:	-12.00 %
Tuesday:	12.00 %
Wednesday:	-12.00 %
Thursday:	12.00 %
Friday:	-12.00 %
Saturday:	10.00 %
Sunday:	0.00 %

[Save](#)

Price exceptions

Monday Tuesday Wednesday Thursday Friday Saturday Sunday

Bezettingspercentage

0% 50% 100%

[Save](#)

In addition to the general rules, a discount or surcharge can be set for specific calendar days. In this case, a color-coded calendar is presented to the administrator that indicates the known occupancy rate for the whole location.

From this view, the administrator can easily apply a date-specific discount or surcharge. If 'Publish as deal' is checked, the online customer will see that the price for that date is a special deal.

3.8.3 Administrator setting seat prices per specific meeting room

In addition to the base seat price per location and the yield management rules, a specific fee can be selected per meeting room. A slider can be used to set a 'Fee' factor multiplier that can range from 0 to 3.

Basics

Naam: 7 The Beach

Length: 6.00 m

Width: 10.00 m

Height: 3.00 m

Area: 60.00 m²

Use in occupancy rate: Yes No

Minimum hours: (1) 0 8

Fee: (1) 0 3

Exportgroep: omzet seats meetingspaces

3.8.4 Administrator creating a voucher

In addition to the rules that set the seat prices on any given moment, the voucher functionality makes it possible to offer completely tailored offers to meet the customers' needs.

The vouchers are provided to a customer by sending a voucher code that can be entered at the time of booking. By following a step-by-step dialogue, all parameters for the voucher can be set.

In addition to the set of conditions that apply to a voucher, a general discount percentage or a fixed price per hour of the day can be specified. It is also possible to set discounts and/or mandatory extras (e.g. drinks, office supplies) that apply to the voucher.

A voucher can be linked to specific customer profiles and/or companies to allow for more detailed control over the redemption voucher's benefits.

To keep track of how the distributed voucher codes are being used, the voucher statistics function (available via the vouchers menu item) shows the monthly top 10 vouchers in use.

<< October 2017 >>			
	Name	Times used	Revenue
1		32	€5940.00
2		30	€19488.00
3		22	€7578.50
4		20	€12722.60
5		19	€10523.00
6		18	€908.72
7		11	€1284.00
8		9	€3816.00
9		9	€2348.50
10		8	€4876.00

3.8.5 Administrator creating a booking

An administrator can create bookings from a single comprehensive screen allowing shortcut entries for all required fields of information. A booking history is stored to facilitate the tracking of changes, also tracking which user made these changes.

The screenshot displays a comprehensive booking creation interface. At the top, navigation links include 'Change date', 'Copy reservation', 'Revisions', 'Send booking', and 'Print'. The main content is organized into several sections:

- Booking details:** Includes fields for Booker, Company, Name, Status (Attention required, Final), and Language.
- Address:** Includes fields for Attn, Invoice e-mail, PO number, Address, Postal code, City, and Phone.
- Seating:** A table with columns: Seats, Description, Setting, Time, Price, Total. It shows 25 seats for 'Sagrada Familia 217a' in a 'U-shape' setting from 9:00 - 17:00 at a price of 17.5, totaling 437.50. A 'Change time' slider is also present.
- Options:** A table with columns: Option price, Change in seats, Total price. It shows 'Food & Beverage' for 25 items at 0.00 each, totaling 0.00.
- Summary:** Subtotal: € 437.50; Total excl: € 437.50; Total 21%: € 91.88; Total 6%: € 0.00; Total incl: € 529.38.
- Payment:** Outstanding amount: € 529.38.

Other sections include 'Back', 'Booking #696235 Meeting Plaza Utrecht 7 November 2017 9:00 - 17:00', 'Edit reservation', 'Notes (0)', 'Check-ins (0)', 'Mail log', 'Event calendar', 'Contacts', 'Part of a serie booking', 'Tags', and 'Invoice'.

3.8.6 Cancelling a booking

When a booking is cancelled, the reason for cancelling is captured. This function feeds the generation of a report that allows for analysis of cancellations.

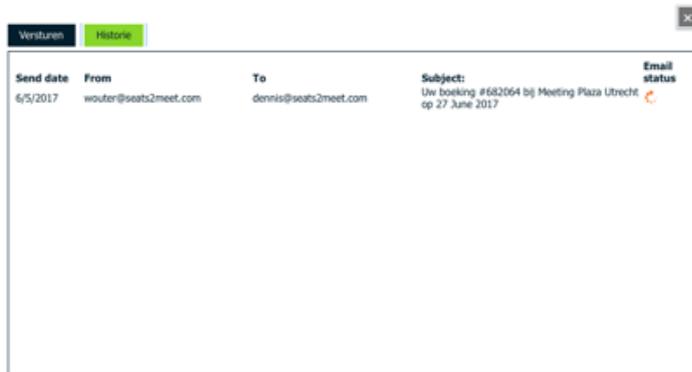
The 'Cancel reservation' dialog box contains the following options:

- Don't want to give a reason
- Found a cheaper location
- Meeting is cancelled
- Other
- No participants
- Going to an other region / city / area
- Meeting is rescheduled

Buttons for 'Save' and 'Cancel' are located at the bottom.

3.8.7 Monitoring email workflow

Part of the booking history information, is the email messaging history. This history displays the date, sender, recipient and subject, as well as the Email status. The status of the email (sent, bounced, received, opened) is updated in real-time.



Send date	From	To	Subject	Email status
6/5/2017	wouter@seats2meet.com	dennis@seats2meet.com	Uw boeking #682064 bij Meeting Plaza Utrecht op 27 June 2017	

4 SOFTWARE DEVELOPMENT PERSPECTIVE

4.1 Introduction

This section describes the overall design, layering and implementation of the application and a brief description of the development process.

The current major release of the application dates back to 2011 and is developed with Visual Studio.Net

4.2 Application architecture

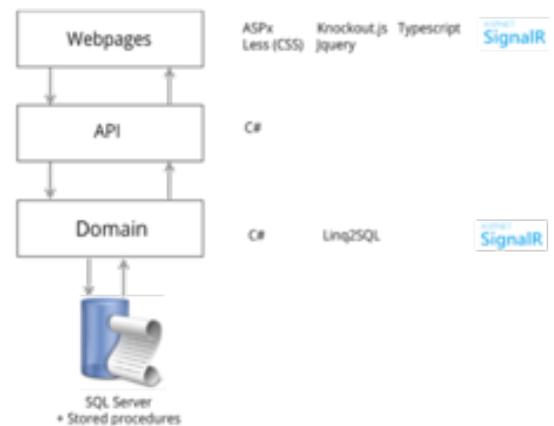
The application has a straightforward overall design and is structured in four layers:

Front-end presentation layer based on ASPx pages, complemented by Knockout, JQuery, Typescript and Less libraries.

Application Programming Interface (API) handling all calls from the presentation layer, or external applications. This layer wraps all the data processing that is handled by the Domain layer.

Domain layer which performs all data processing and object relation mapping before interacting with the database.

Database with stored procedures. The stored procedures handle much of the more complex business logic.



4.2.1 Design history

Here are a few clarifications to help understand key design decisions in the application architecture.

The application front-end was developed prior to the release of the Microsoft Model View Controller framework. The LINQ to SQL framework, which predates Entity Framework, was used for Object-relational mapping. The business logic has in many cases been implemented in stored procedures in the database layer due to performance considerations. A current development is that the LINQ to SQL framework is gradually being bypassed by firing SQL queries to the database directly.

4.2.2 Web pages layer

The web pages layer consists basically of a collection of ASPx pages that make use of several JavaScript libraries to interact with the Application Programming Interface layer. Some elements that are in common use by multiple pages are referred to as 'snippets'. The layout of the pages of the pages is governed by cascading style sheets (CSS) and Less for CSS pre-processing.

A recent development is the incorporation of the ASP.NET Signal R framework in both front- and backend for the development of functions that need 'real time' and bi-directional communication between server and client. This way the server can push content to connected clients instantly as it becomes available. At time of writing this is implemented for tracking the status of email workflow between location managers and prospect customers.

Multilinguality

The presentation layer makes use of resource files (.resx) to generate the correct presentation for any language. Each language has its own set of these files for each entity in the application domain layer. This results in well over 100 files per language. The .resx files are generated by the

Microsoft Multilingual Toolkit that takes in .xlf files that are common standard for professional translators. Adding an additional language requires a translation of over a 100 files.

To date, five languages are supported in the front-end application: English, Dutch, German, Spanish and Portuguese. The backend functionality is provided in English only.

4.2.3 Application Programming Interface (API)

The API provides access to a subset of the domain layer of the solution. The API endpoints have been described in detail in the S2M API documentation (available upon request) and the automatically generated documentation available at <http://staging.seats2meet.com/help>

API users can authenticate with the login endpoint to obtain a profileToken. The profileToken can then be used to interact with the API.

All API endpoints are nouns upon which methods can be invoked. Some nouns (e.g. Location) can have over 60 methods, while others may have only one (e.g. Tender). An overview is given below, in which endpoints are categorized in the functional areas of the system.

APPLICATION PROGRAMMING INTERFACE V2.0				
BOOKING				
Availability	Invoice	Meetrequest	Reservation	Subscription
Cart	License	Payment	Review	Unit
Channel	Location	Profile	Search	Voucher
Company	Login	Reservation	Specialdeal	Workspace
Country				
LOCATIONS				
Account	Customer	License	Option	Tender
Budget	Invitation	Meetingspace	Package	Virtualmanager
Contact	Group	Openinghour	Subscription	
PRESENCE, COMMUNITY & SERENDIPITY				
Activity	Checkin	Event	News	TSM
Article	CheckOut	Group	Question	
Chat	Comment	Member	Tag	
MONITORING & REPORTING				
Account	Draft	Search	Warning	
Customer	Notification	Statistics	Yield	
SYSTEM UTILITIES				
Auctocomplete	Cache	Util	SendGrid	

4.2.4 Domain and database layers

This layer contains all code that maps all API request to calls to the database, its views and stored procedures. More background information on the LINQ to SQL framework that is used can be found here: [https://msdn.microsoft.com/en-us/library/bb386976\(v=vs.110\).aspx](https://msdn.microsoft.com/en-us/library/bb386976(v=vs.110).aspx)

The ASP.NET Signal R framework (mentioned in 4.2.2) is also applied in the domain layer to facilitate content push from server to clients.

For an impression of the table layout in the database, please refer to Appendix 1. Here a schema generated from Visual Studio is provided for some data intensive classes.

4.2.5 Third party integration

In addition to the API that is provided by the system, webhooks can be used to push information to third party APIs. To date, integrations have been made with a partner's SAP system and CRM system to provide them with booking information.

4.3 Development and testing process

Some defining characteristics of the current development process at Cyberdigma B.V. are:

Organizational Context

- Close/direct interaction with end-users and commercial staff
- Small team of two core developers, complemented by contract workers.

Development, test and release process

- Opportunistic release cycles (variable windows)
- Mostly incremental updates & improvements / maintenance updates
- Developers test their own work
- No formalized development method in place
- Historically, no unit testing, automated testing or continuous integration practice were in place. Gradually being phased in for the delivery of new functionality.
- Visual Studio Team Services is in use as main repository and collaboration space

Codebase

- Consistently applied naming conventions
- Informal guidelines for code structure and documentation in the codebase itself

4.4 Maintainability

Due to the straightforward design of the application and consistent naming conventions, its general structure can be understood fairly easy. Upon closer inspection, each layer has some aspects that require hands-on experience with the codebase to navigate. For each of the layers, some points of attention are given below.

Presentation

This layer consists of many files in many folders. Mapping the page flows to each of the pages and their components and styling convention, requires hands-on experience with the page structure, the used libraries, configuration and translation files. An experienced .net developer should be able to find his/her way fairly easy.

Application Programming Interface

The API has a clear structure that requires a conceptual understanding of the application services that are available on the system. Some of the required higher-level clarification is provided by this document as well as more in depth in the separately available API manual and the additional online reference (<https://staging.seats2meet.com/help>).

Domain and Database

Within the scope of this version of this document, there has not been an extensive survey of the domain and database layers and their interaction. Processes such as the calculation of pricing information, as part of the yield management logic of the application, involve stored procedures with nested SQL statements. These procedures may prove to be the most intricate part of the

application. For an impression of the data structures in the database, please refer to Appendix 1.

4.5 Security

All application traffic is encrypted with 256-bit SHA. The frontend pages make calls to the API and pass a token for a CRC check. This CRC check prevents tampering with the parameters that are passed to the API.

All API calls are regulated by an authentication mechanism that provides a token to the client. API accounts have fine-grained access and permission settings that are administered by the system administrator.

User profiles are stored and maintained in the platform database. All passwords are encrypted with the BCrypt algorithm.

4.5.1 Account permissions

Back office users have access to information that is available for the locations that are assigned to their account. Permissions can be set in fine detail per account. For each functional area of the application, permissions can range from None, to Reading, Updating (Edit) and Create/Delete (Admin).

The screenshot shows the 'Edit account' form with a table of permissions. The table has columns for user types (Owner, Employee, Supplier, Accountant) and permission levels (None, Read, Edit, Admin). The 'Type' dropdown is set to 'Employee'. The 'Location' dropdown is set to 'None'. The 'Invoice', 'Meetingspace', 'Workspaces', 'Price settings', 'Options', and 'Booking' rows have 'Read' permissions. The 'Vouchers' row has 'Edit' permission. The 'Accounts' row has 'Read' permission. The 'Reports' row has 'Edit' permission. 'Save' and 'Cancel' buttons are at the bottom.

	Owner	Employee	Supplier	Accountant
Type		<input checked="" type="checkbox"/>		
	None	Read	Edit	Admin
Location		<input checked="" type="checkbox"/>		
Invoice		<input checked="" type="checkbox"/>		
Meetingspace		<input checked="" type="checkbox"/>		
Workspaces		<input checked="" type="checkbox"/>		
Price settings		<input checked="" type="checkbox"/>		
Options		<input checked="" type="checkbox"/>		
Booking		<input checked="" type="checkbox"/>		
Vouchers			<input checked="" type="checkbox"/>	
Accounts		<input checked="" type="checkbox"/>		
Reports			<input checked="" type="checkbox"/>	

5 OPERATIONS PERSPECTIVE

5.1 Overview of deployment architecture



The system, with exception of the payment processing, runs entirely on the Azure infrastructure as offered by Microsoft. Working with Azure has many operational advantages such as a high scalability and a high cost efficiency.

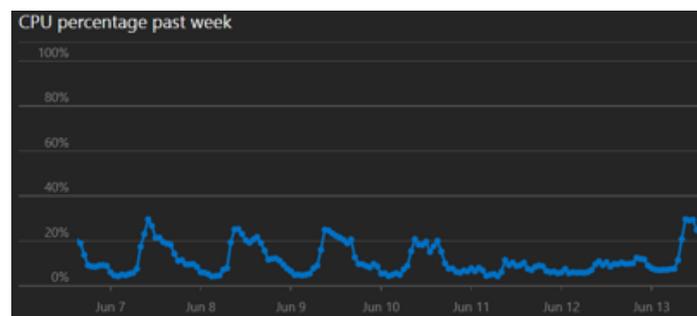
5.1.1 Default configuration

The application runs on two 'small' load balanced web server instances with each one processor core and 1,75 GB memory and a single instance of SQL Server. 'Small' in this case refers to the package name that is offered by Azure. All online payments are processed on the infrastructure of Icepay. All E-mail traffic is handled by SendGrid.

An emergency switch to Amazon Cloudfront can be made in case an emergency fallback is needed.

5.2 Infrastructure workload

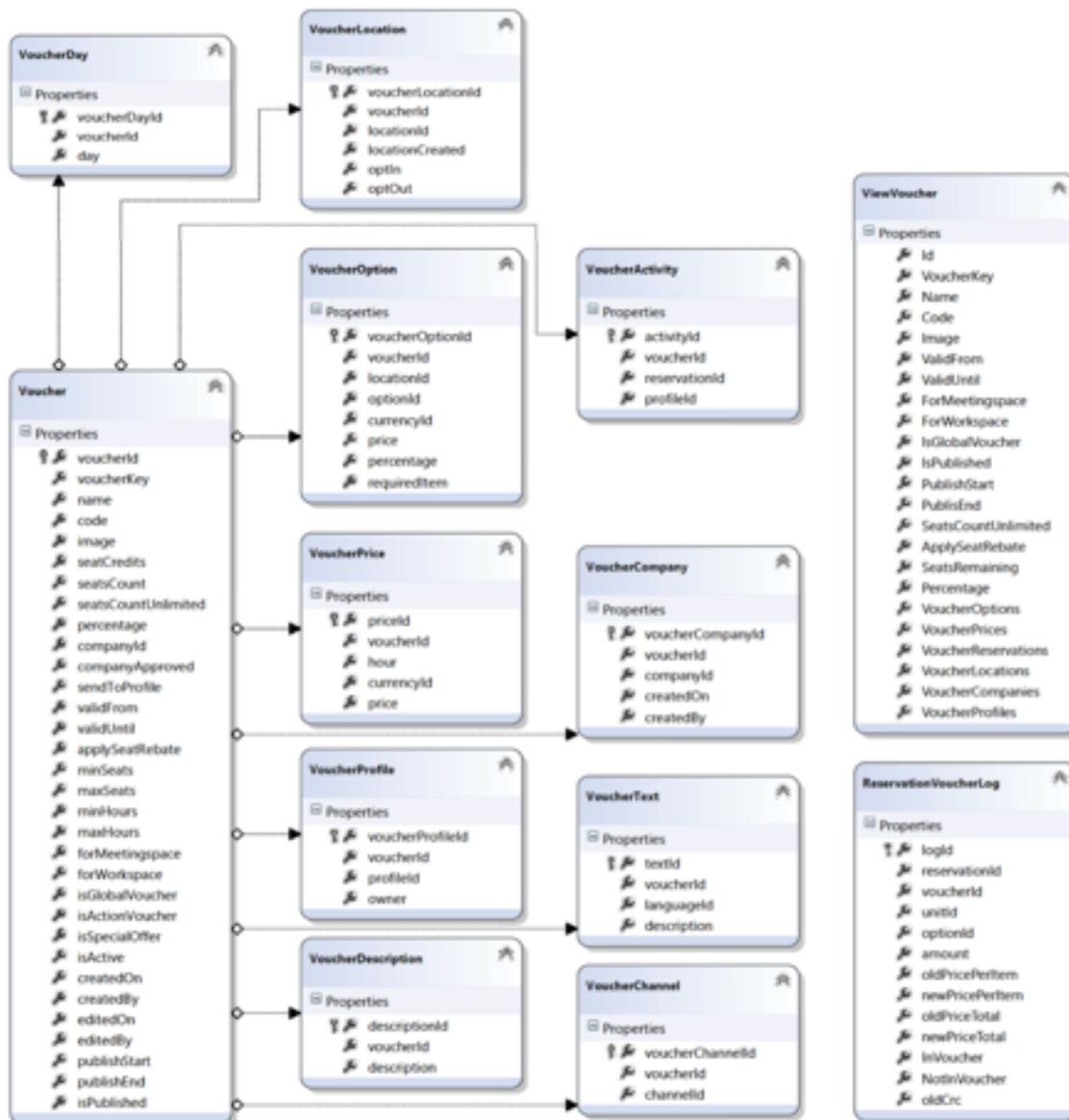
On an average workweek, the peak load for the configured processor capacity is 30%. In case traffic would jump such that performance starts degrading, Azure will seamlessly add additional server instances of equal capacity. The server administrator can also decide to increase the processing power of a single instance manually. This is of use in case more processing power is needed (e.g. for running a batch of reporting queries).



6 APPENDIX 1: CORE CLASSES DATABASE SCHEMAS

All database schemas can be accessed in the 'Domain' layer of the solution architecture. Visual Studio can generate visualizations of the .dbml files that are the Object/Relational mapping definitions between the code and the database.

6.1 Voucher



6.3 Profile



6.5 Reservation

