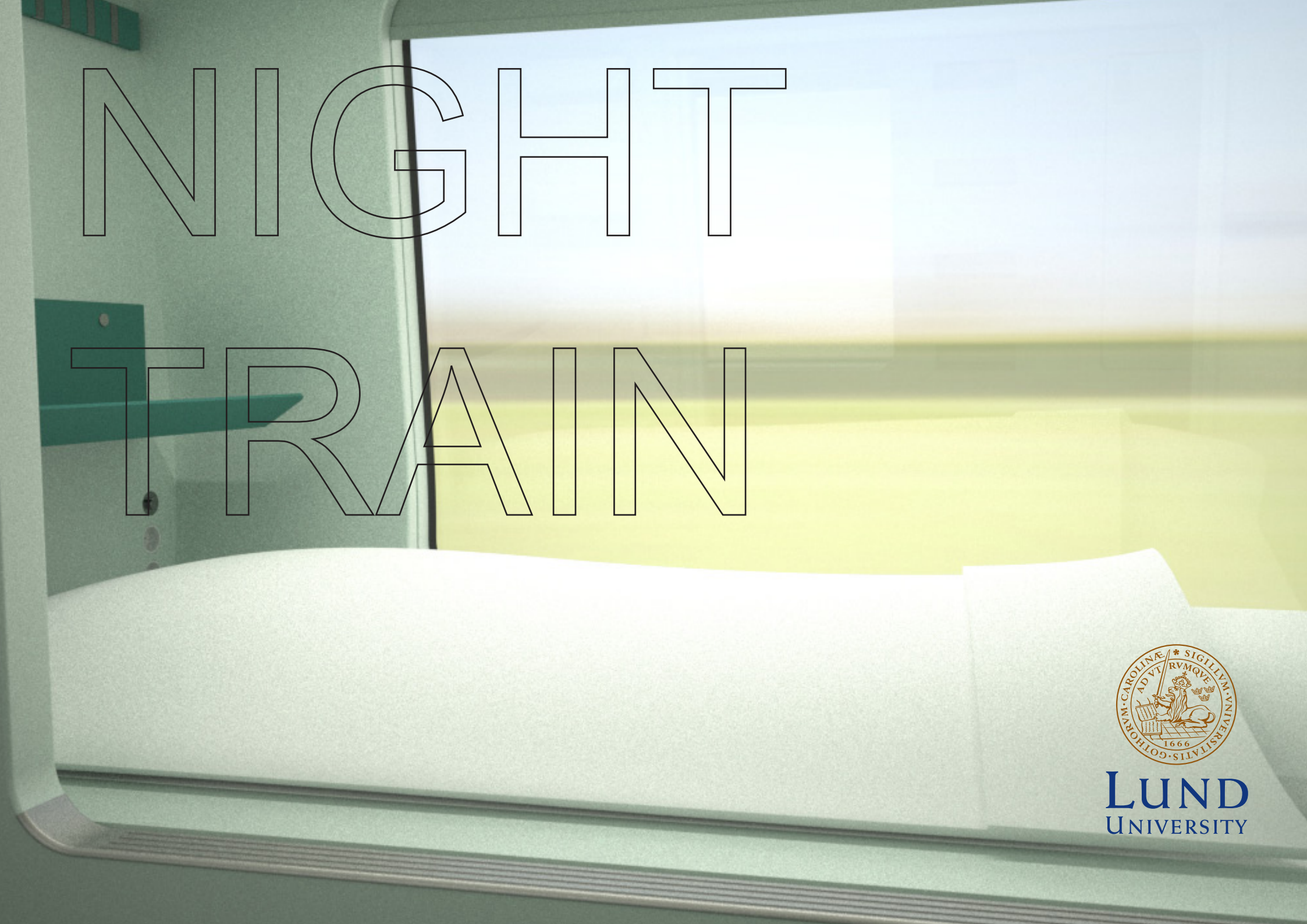


LUND
UNIVERSITY

NIGHT TRAIN

Degree Project for Master of Industrial Design from Lund University
School of Industrial Design Department of Design Sciences
Examiner: Professor Claus-Christian Eckhardt
Supervisor: Lecturer Per Liljeqvist
2015
ISRN: LUT-DVIDE/ EX--15/50298—SE

ACKNOWLEDGEMENT

I want to thank Per Liljeqvist, who, despite not having met me in ten years, undertook to be my supervisor. He gave me great freedom in my work, which I appreciated.

I would also like to thank my examiner Claus-Christian Eckardt for his confidence and patience.

A huge thank you to the train enthusiasts on the forum Postvagnen, who have helped me on this journey.

Thanks also to Marie Savard for technical support, to Annika Burman for linguistic support and Ludovico Einaudi for soothing moments.

The greatest thanks goes to my wife Lisa who has given me time to complete my degree.

Tor and Klas, now I will come home again!

ABSTRACT

De nattåg som är i drift i Sverige är minst tjugo år gamla och med en standard som inte attraherar nya resenärer. Tågtypen som används, Intercity, är den långsammaste typen av fjärrtåg vi har i Sverige. Nattågen gör dessutom många stopp under sin färd vilket gör att restiderna blir långa för att nå slutdestinationen.
I mitt koncept valde jag att vända på det genom att använda en snabb tågtyp och begränsa antalet stopp under resans gång med ambitionen att komma långt på en natts resande.
Genom att göra så kan man nå destinationer som i dagsläget inte är så attraktiva för tågresenärer. Valet för många idag är att flyga eller inte åka alls.

Mitt examensarbete har grunden i Gröna tåget, en studie som har utvärderat vilken tågtyp som är mest lämplig för den Nordiska marknaden baserat på de förutsättningar vi har.

Resultatet av mitt arbete blev ett koncept av ett helt nattåg.
Grunden till min lösning bygger på att man inte har en egen sittplats i tåget, utan endast en sovplats. Den vakna tiden kan man tillbringa i den sociala delen av tåget, i bistron, om man inte vill vara i sin förbokade pod eller kupé.
Mitt huvudfokus har varit två olika bäddtyper, som ersättare till dagens liggvagn och sovvagn.
Utformningen av den billigare bäddtypen, ersättaren till liggvagnen, är en för tågindustrin unik pod. Det är ett rum som bara rymmer en bädd, där man kan skärma av sig från medresenärer. Bädden kommer i två bredder, för en person eller för två. Poddarna, som är placerade utefter tågets sidor, har alla panoramafönster vilket ger en fin reseupplevelse.
Utformningen av kupén är mer traditionell med de funktioner man kan förvänta sig av en sovvagn, som egen dusch och toalett. Utöver det finns det bland annat en dubbelsäng och ett stort fönster som ger fin utsikt.

Tanken med mitt koncept har varit att skapa ett mervärde till resan utöver den stora tidsvinsten det snabbare tåget bidrar med, att skapa ett koncept som skulle kunna säkra fortsatt natttågstrafik i Sverige.

SUMMARY

The type of night trains currently in traffic on Swedish rail networks are in general at least twenty years old and of a standard which do not attract new travellers, and they are not designed to offer added value to the journey. The current type of train, Intercity, is the slowest type of long distance trains that is used for passenger transport. In addition to not reaching high speeds, the trains often make many stops along the route.

If we were instead to do the opposite: use trains which can reach highest speeds possible and limit the numbers of stops along the route. To have the ambition to reach as far as possible, or to at least reach a desired end destination after a night's travelling.
I have used the study 'Gröna Tåget' (The Green Train) as a reference in my work and used the type of carriage which has been recommended for use as national passenger trains in the near future.

Travelling by night train could be a formidable way to take weekend trips within Sweden. You leave on a Friday night and arrive at your destination on a Saturday morning feeling refreshed and can look forward to a weekend with an overnight stay at your destination. On the Sunday night, after being able to taking full advantage of your stay, you board the train and catch a night's sleep whilst taking the return journey back home. You arrive rested, and having brought a change of clothing, can go straight from the train to your place of work.

The aim of this project is to show that it is possible to increase the status of night trains, that it can have a future as a way of transport if it can be developed to attract both today's and future passengers.
That if you fulfil their high expectations of comfort and convenience, you can create something great.

Through research, interviews, and private train travels, and my professional experience of designing train interiors, I have developed an interior concept for a way of travelling by night train.

The result is a night train concept, consisting of a layout of a complete train set. I have also focused on two different types of passengers: a passenger who would traditionally choose a sleeping car with a lavatory and shower facilities, and a passenger who would choose the more basic alternative of a couchette car. These concepts focus on what is would be expected from a pleasant travelling experience, both as a single traveller and when travelling as a family.

The overall concept is based on the idea that you do not have an assigned seat for the trip, you just have an assigned bed or a compartment. During the time you are awake on the train you either spend time in the social area/ bistro or stay in your compartment/bed. The bed concept is a pod, a space which will keep you separated from your fellow travellers so that they do not disturb you, or you disturb them.
To ensure the best possible bed comfort, the bed is just for sleeping. It is not a seat which transforms into a bed which often will compromise on comfort. The bed is available in two different sizes: for single travellers (800 x 2000 mm) and for the loving couple, parent with a kid or for someone wanting more space: a small double (1200 x 2000 mm). The compartment will be fitted with two beds, one of each size.

A night train could in the future be a fantastic way to experience Sweden. It could be an environmentally friendly and excellent alternative to air travel for longer domestic journeys, but to achieve this we need to be better at adapting to the customer's needs and requirements.

CONTENTS

DEFINITIONS

GRÖNA TÅGET - The Green Train is a fast train and high speed train concept that is economical, environmentally friendly and attractive to travellers. The concept is designed for Nordic conditions with harsh winters, often varying demand and mixed passenger and freight services on non-perfect tracks.
The main proposal is a multiple unit trains for speeds up to 250 km / h equipped with tilting for short travel times on electrified main lines. The train concept is intended to be a flexible platform for long-distance traffic as well as a fast regional services, with the ability to run in Denmark, Norway and Sweden.
The Green Train is a collection of ideas, proposals and technical solutions for rail traffic operators, industry and infrastructure managers.

HIGH-SPEED TRAINS - The Definition for high speed varies, in Sweden it refer to trains that can reach a speed of at least 250 km / h.

FAST TRAINS - Is the Swedish definition of trains running at a speed of 200-249 km / h.

LOCOMOTIVE - A train type where a locomotive pull carriages. No passengers are travelling in the locomotive.

EMU - Electrical Multiple Unit consists of driving motor cars at either end with carriages connected in between.

TILTING - Cars leaning inwards in curves to give passengers greater comfort. It is the car body that is leaning, not the rails or the driving train. In Sweden the SJ2000 train have tilting capacity.

INTERCITY - In Sweden it is a concept for simpler trains travelling long-distance routes.

LONG DISTANCE TRAINS - Passenger trains that travel longer distances.

SJ2000 - An Electrial Multiple Unit that previously went under the designation X2000. The vehicle type is called X2, and is a fast train. It was produced from 1989 to 1998. What distinguishes SJ2000 is that it has a tilting capacity, allowing it to run faster in curves than traditional train.

NIGHT TRAIN - A passenger train primarily in traffic at night. The train usually consists of sleeping cars and couchette cars, and sometimes regular seating might be included. In Sweden, these train sets are old and are pulled by a locomotive.

SLEEPER - coaches with compartments that are fitted with beds. There are usually 2-3 beds in each compartment, these can at daytime be configured into a sofa with seating for 2-3 passengers. These compartments can hold a basin, a lavatory and even a shower.

COUCHETTE - coaches with compartments fitted with bunks. There are usually six bunk beds, and these can for daytime be configured into two couches, seating six passengers.

REQUIREMENTS FOR DISABLED PASSENGERS - Two seats for people with wheel chairs is a requirement for a train set of 30 - 205 metres. On board the train the disabled passengers must have access to a universal toilet, a chair and if there is catering avilable onboard, then this must also be accessible to disabled passengers.
The aisle width is required to be at least 800 mm and for turning a wheelchair, a turning radius of 750 mm is required.

INTRODUCTION

TOPIC BACKGROUND

I have been working as an industrial designer for some years prior to making the decision to do my degree project. In our office we have in the last few years worked on several types of track connected projects. It has concerned tenders, concepts for evaluation, details of interiors for evaluation, firm orders and also some projects which have been approached on a conceptual level.

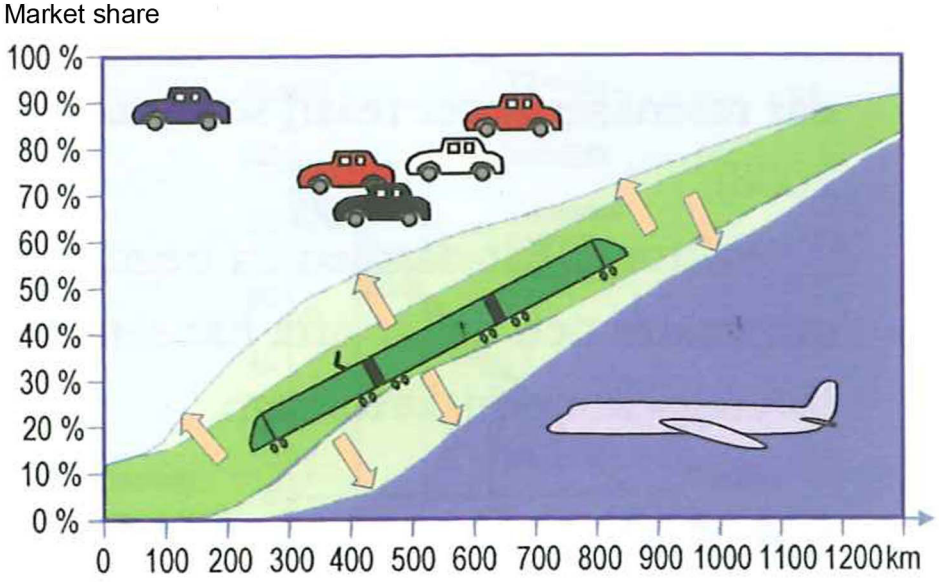
With these projects we reached a final solution through working as a team which included the client. The solutions were reached while taking clear limitations like finances, personal opinions etc, into consideration, something which is a natural part of the process.
This degree project is providing me with the possibility of making my own decisions, thus providing me with more scope.

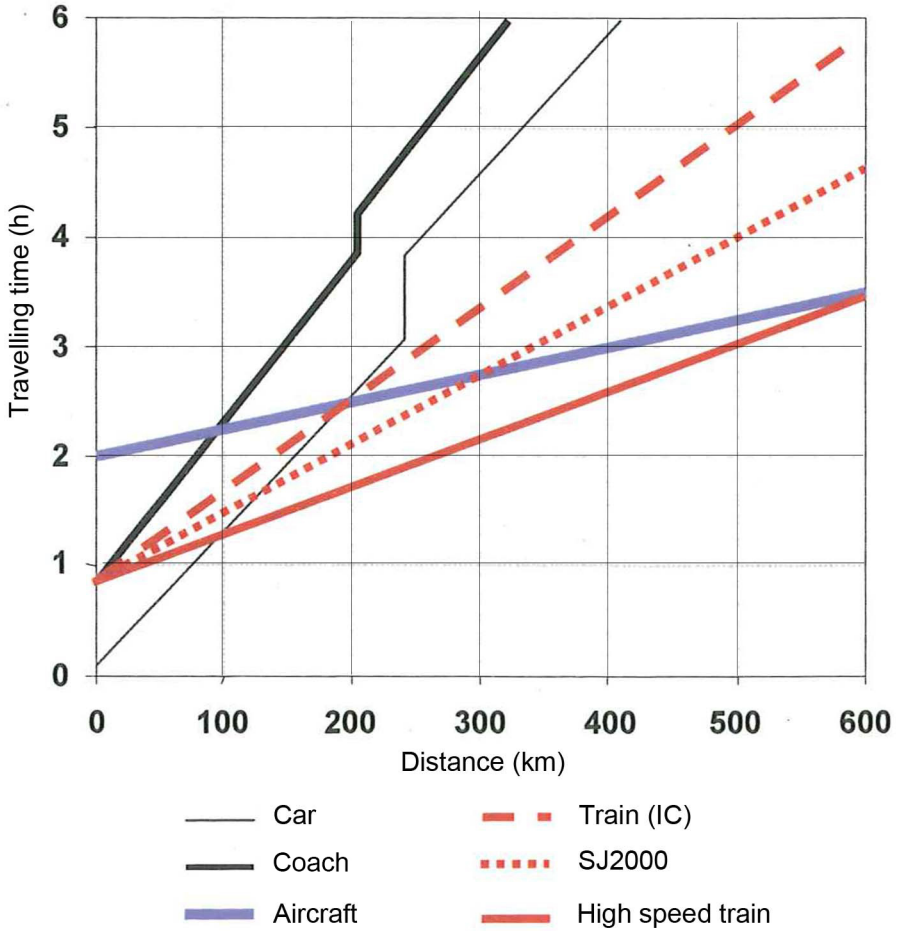
I have used the research and development program Gröna Tåget (The Green Train) as the basis, for this dissertation and through research of the history of trains, interviews and other investigations it made me see a, for Sweden, old, but still current, theme: the increasingly peripheral night train. As night trains are not included in the Gröna Tåget dissertation, this project is providing me with the opportunity to make an addition with this work. One of the main differences compared to existing night trains is that Gröna Tåget advocates a wider carriage body. It might seem like a minor detail but a few additional decimetres to an already compact space can provide completely new possibilities.

The trigger to my project was when I saw these three illustrations, combined them and made my calculations.

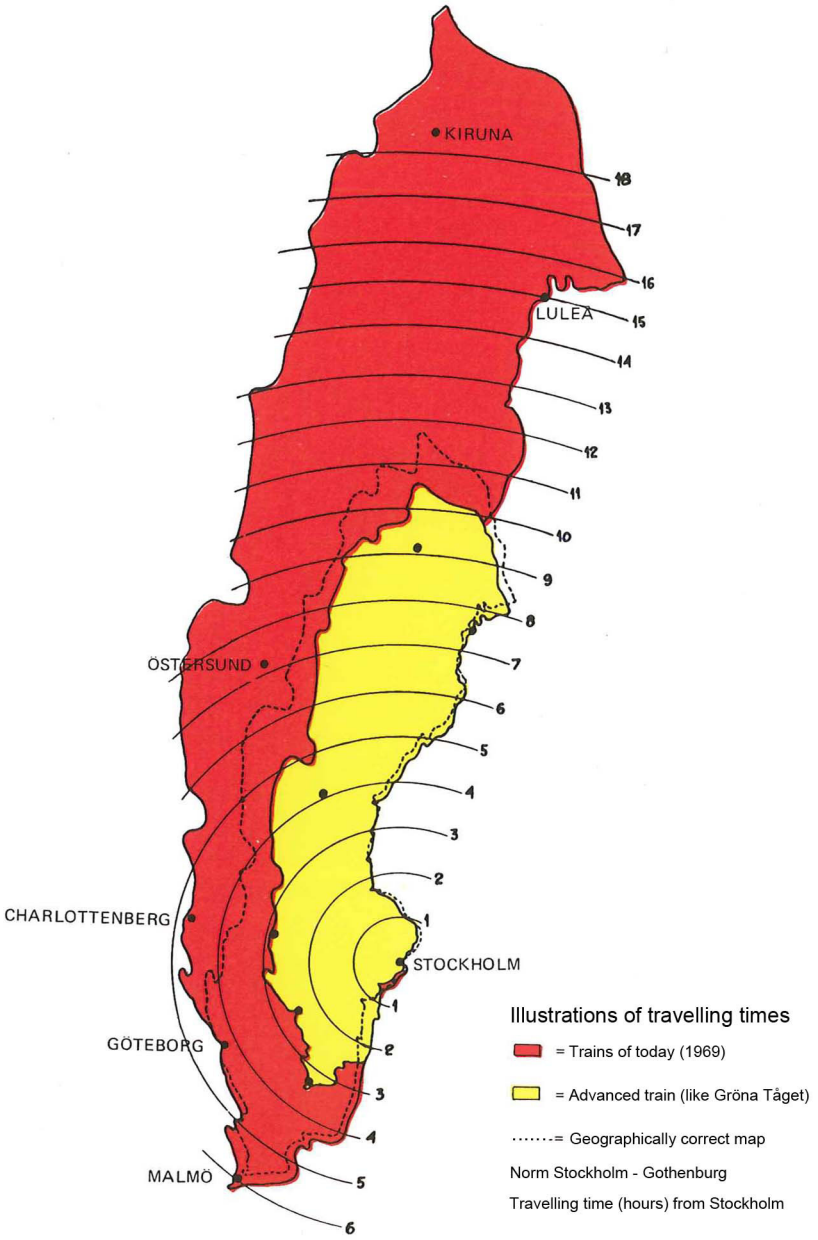
The map dates from a high speed train investigation conducted in 1969. The time it takes to travel by train to Swedish Lapland in the far north today has hardly changed since then. Would it be possible to change this without extreme infrastructural changes? With minor changes on the infrastructure, a train like Gröna Tåget would be able to go from Stockholm to Kiruna (Abisko/The Ice Hotel/Nordic Light) in about 11 hours which, would be possible to accomplish overnight. This would make a great difference to today when the night trains travel for about 17 hours. It is actually a new market. The first chart shows the market share for car/train/air plane with regards to travelling distance. The arrows show that a train which runs at a higher speed take market shares from the others. The other shows how far you reach withn a certain time period, depending on mode of transport.

And if you travel while you sleep you experience time in a different way, an 11 hour journey might feel like two hours and how do you put a value that?





A diagram showing the length of time to travel by various modes of transport door to door, included connecting journeys, changes and breaks when travelling by car or coach.



PROBLEM DEFINTION

Long distance train travel has since long lost many passengers to air travel and night trains are facing a slow decline towards extincion. The night trains available in Sweden are old and offer nothing extra to passengers.

Some new thinking is required to entice people back to the night trains and give the passengers what they want. The trains must be adapted to the current way of life.

GOALS

My goal with this project is to make an overhaul of the interiors, mainly the essence of a night train: the place of sleep and its context. To provide these spaces with a design which meets the passenger's requirements and enforces the enjoyment that can be experienced through train travel. As I have chosen to develop a design of a train set, it will also include social spaces, a bistro, entrances, lavatories, spaces for storing luggage, refuse handling, staff spaces etc.
The goal is to provide an overall concept instead of focusing on individual details.

DEMARCATIONS

What has been excluded in this project:

- The exterior.

- Ceilings, as in panels, integrated lights, air distribution etc.

- A service concept. What is served in the bistro, etc.

- Ticket prices.

METHODS

I have conducted research on the internet (from forums/google) and by reading books about the history, current usage, and the possible future, of trains. I have searched for images within the train sector and elsewhere with connection to this subject, in order to gather as much information as possible.

I have interviewed people with experience of travelling by night train. The number of interviews does not hold statistically but has been a great inspiration during the process.These interviews have been conducted in a conversation format where I occasionally have been required to steer the discussion in order to not miss out on answers to some of my questions.
To be able to see what is possible to fit into the limited space that is available, the car body, I have been sketching and worked in CAD (in the early stages only with cubes/volumes to understand the restrictions/possibilities with the available space). I have built upwards, across, at angles and with overlaps to be able to compare the different alternatives.
I have conducted simple studies of volume during the project and with a yardstick at hand, to be able to get a feel of the ideas I have been working on.
I have made very basic mock-ups using items at hand.
To ensure nothing was missed I have conducted function analysis of the various directions I have been working on during the working process.

Design process:
1. Define the problem/Identify the challenge
2. Collect information/Understand the task
3. Generate ideas
4. Explore ideas
5. Test and analyse... and if it does not really solve the problem just do it all over again... and again... and again until you are happy with the outcome.

RESEARCH

A BRIEF HISTORY OF TRAINS

Wagon ways, or railways, originated in the mid-1500's. In the beginning these railways exclusively serviced the mining districts of England. The rails were made of wood and carriages pulled by horses.

The next step was to dress the rails with a thin plate of iron to reduce wear. It turned out not to be the optimal solution when the plate got dented. In 1767 the first rails made entirely out of iron were cast at Colebrook Dale Ironworks in England.

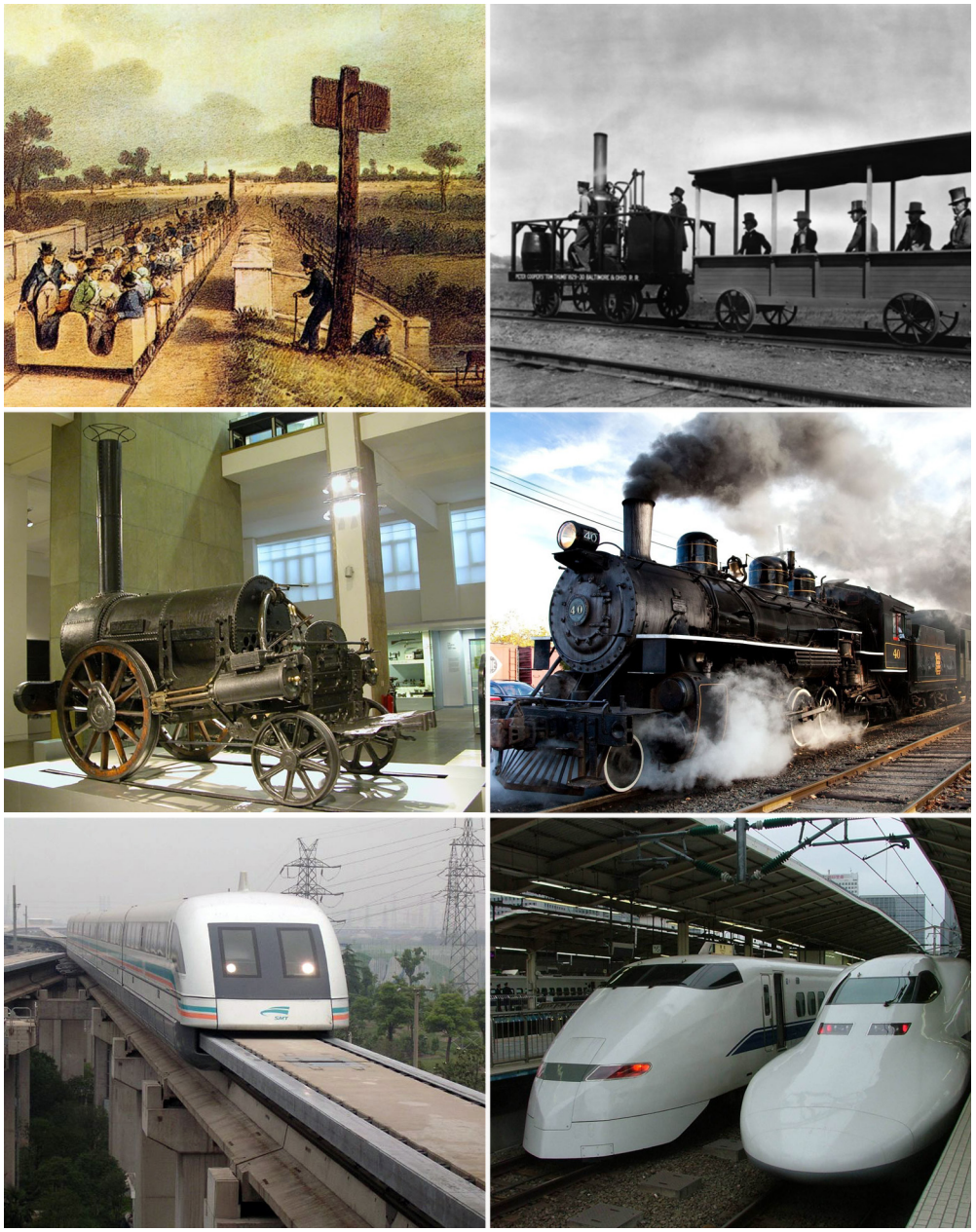
In 1804 the development of steam locomotives began. Ten years later the locomotive, the Blucher, succeded in pulling a train weighing 30 tons. It was a huge breakthrough and the beginning of the steam engine.

The Stockton & Darlington was the first railroad to use steam power, it opened in 1825.

In 1829 there was a competition between three steam locomotives for a contract at the Liverpool & Manchester railway that was about to open the following year. The winner was "Rocket". It came up to a speed of 40 km/h on its first tour.

From the 1910s onwards the steam locomotives began to be replaced by the cleaner and less labour-intensive diesel locomotives and electric locomotives.

A new technique was developed in Great Britain during the 1960's, the maglev train. It was using magnets to set the train into speed. The project was put on hold due to lack of money.



A painting from the beginning of steam train / Tom Thumb, 1830s / Rocket / Traditional steam train / Maglev train / Shinkansen, two models.

The first commercial maglev train was used in Birmingham in 1984, a 600 meter long monorail between the international airport and the railway station. It was a slow train, 42 km/h. The track was shut down in 1995. Japan and Germany started to develop maglev trains in the 1970's. In 2003 the japanese JR-Maglev set a new speed record, 581 km/h.

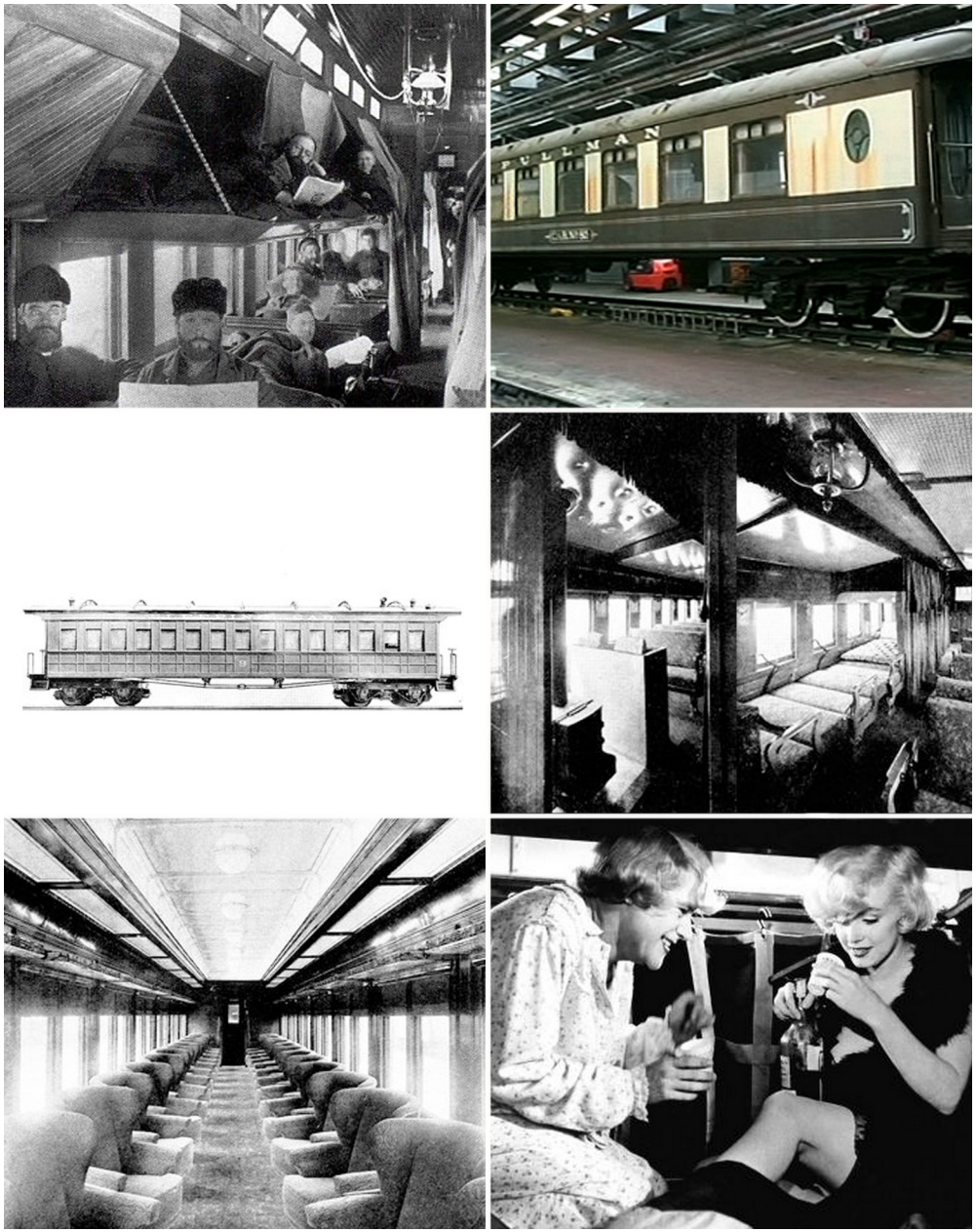
One growing train category is the long distance high speed rail. It runs on dedicated tracks which are adapted for high speeds. The first train in this category was the Japanese Shinkansen that was put in traffic in 1964. Other examples in this category is the French TGV and the Spanish AVE. TGV is the fastest wheeled train running on rails, 575 km/h.

The future could be the fuel cell locomotive which combines emission-less operation and do not require an electrical system.

Scientists are now studying the possibilities to use maglev trains in vacuum tunnels. By doing so it would be possible to reach exquisite speeds, up to 2900 km/h.

NIGHT TRAINS
n 1836 the first sleeping car was introduced. It went between Harrisburg and Chambersburg in the United States. The car was provided with a basin and water.

In 1865 the luxurious sleeping car "Pioneer" was built by George Pullman. It was the start of the Pullman era. Pullman continued to build sleepers until 1980.

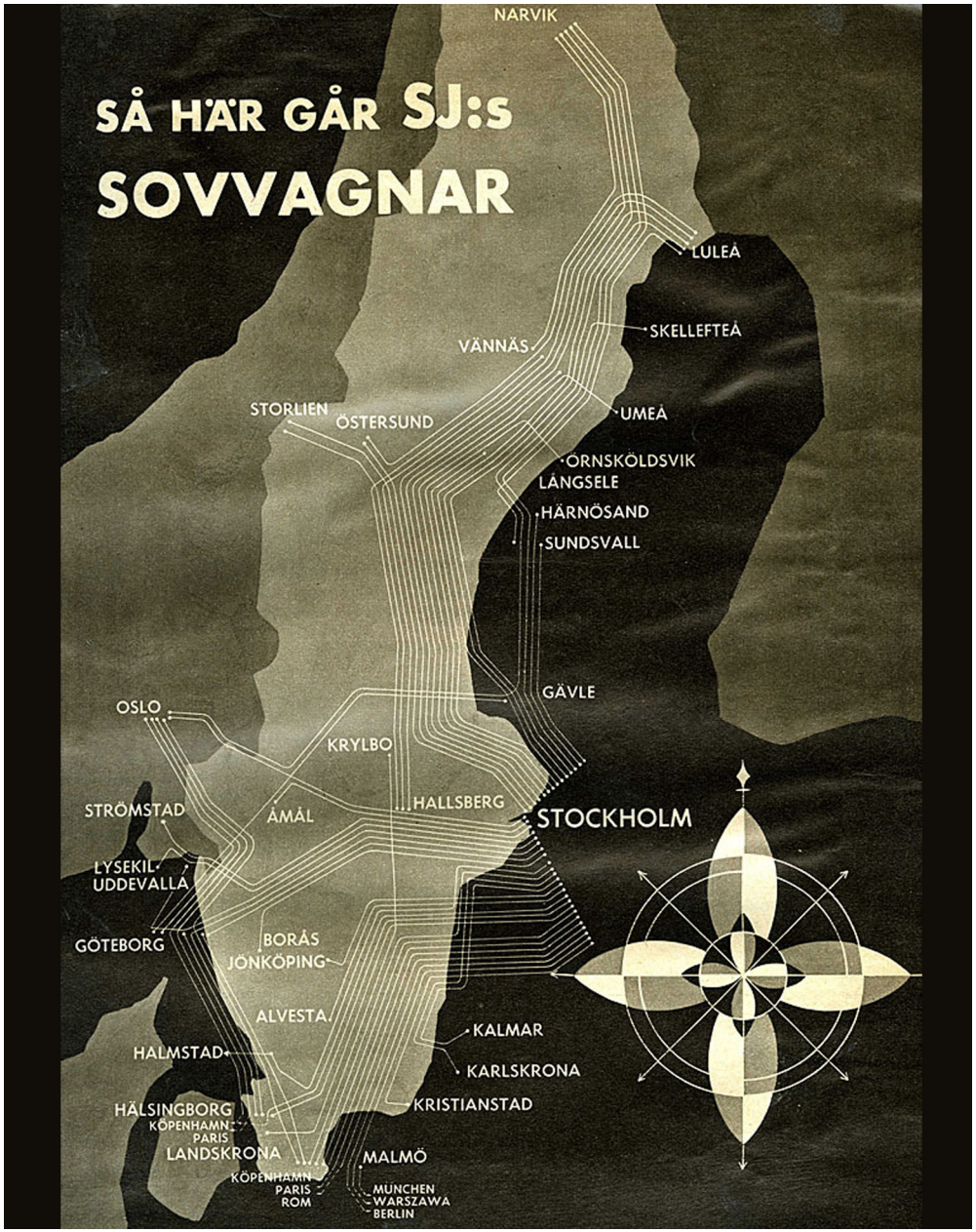


A Pullman sleeper, 1880's / A Pullman car in its characteristic green colour, 1930's / An early Pullman / Interior of an early Pullman / A Pullman parlour car / 'Some Like it Hot', the famous sleeper scene with Tony Curtis and Marilyn Monroe

Sweden were running many trains with international trains destinations. Between 1920-1970 trains departed with final destinations such as Berlin, Budapest, Belgrade, Moscow, Amsterdam, Paris, Innsbruck, etc.

The routes for sleepers in 1962, make up a rather long list:
Stockholm - Narvik
Stockholm - Luleå
Stockholm - Skelleftehamns Övre
Stockholm - Umeå
Stockholm - Vännäs
Stockholm - Örnsköldsvik
Stockholm - Långsele (via Sundsvall)
Stockholm - Härnösand
Stockholm - Sundsvall
Stockholm - Storlien
Stockholm - Östersund (via Bollnäs)
Stockholm - Östersund (via Sundsvall)
Stockholm - Mellerud (via Kil)
Stockholm - Uddevalla (via Herrljunga)
Stockholm - Göteborg
Stockholm - Borås (via Herrljunga)
Stockholm - Jönköping (via Nässjö)
Stockholm - Halmstad (via Hässleholm)
Stockholm - Alvesta
Stockholm - Kalmar (via Alvesta)
Stockholm - Karlskrona (via Alvesta)
Stockholm - Karlshamn (via Hässleholm)
Stockholm - Helsingborg (via Hässleholm)
Stockholm - Landskrona (via Eslöv-Billeberga)
Stockholm - Malmö
Stockholm - Oslo
Stockholm - Köpenhamn (via Helsingborg)
Stockholm - Köpenhamn (via Malmö)
Stockholm - Berlin
Stockholm - Warszawa (winter/spring)
Stockholm - Paris (via Malmö)
Stockholm - Milano (via Malmö and via Basel (fall) / via Chur (winter))
Stockholm - Roma (via Helsingborg)
Östersund - Luleå
Ånge - Boden
Sundsvall - Luleå
Mjölby - Luleå
Mjölby - Vännäs
Mjölby - Storlien
Göteborg - Gävle
Göteborg - Oslo
Göteborg - Köpenhamn
Malmö - Krylbo
Malmö - Västerås (via Flen-Eskilstuna).
Malmö - Göteborg
Malmö - Oslo

During the winter service the following routes were added:
Stockholm - Hede
Stockholm - Sälen
Stockholm - Borlänge
Stockholm - Otta (via Lilleström)
Stockholm - Lilleström
Göteborg - Storlien
Göteborg - Sälen
Göteborg - Borlänge
Göteborg - Dombås
Göteborg - Ål
Hallsberg - Storlien
Norrköping - Storlien (via Mjölby)
Mjölby - Hede
Malmö - Storlien



A poster from the fifties or sixties displaying the routes for Swedish sleepers.

In the 1990's, international rail services began to decrease due to air traffic.

Routes with night trains in 2015:
Göteborg - Stockholm - Åre/Storlien
Malmö - Stockholm - Åre/Storlien
Malmö - Göteborg - Åre/Duved
Göteborg/Stockholm - Luleå
Stockholm - Narvik
Stockholm - Malmö
Malmö - Berlin (summer)
Malmö - Göteborg - Mora - Röjan (Only a few trains during the winter 2012, with bus transfer to Vemdalen)

The sleeping cars and couchette cars currently in service are all old. The oldest originated in the 1950's, while the newer ones are from the early 1990's. The majority have been reconditioned one or more times. The cars all have the same basic layout, there are no major differences between them.

It is not only in Sweden that night train travelling is decreasing, the situation is similar throughout Europe. Many routes will be closed when the trains can no longer compete with air, car and bus travel. The route Stockholm - Malmö was about to be closed down but the decison has for the time being been postphoned.

Of those who travel by night train, the majority, 60%, are infrequent travellers who travel at their leisure. Business passengers make up only 15%.

According to a survey SJ did a few years ago the cause of the night train decrease was the competition from low-cost airlines and the low standard of the trains.

INTERVIEWS - SUMMARY

Sleeping
As much privacy as possible
Preferably in a wide bed if I traveling with children

Luggage
Storages in proximity to the bed.
Valuables kept in a smaller carried bag.

Private lavatory / shower
When you travel at your leisure it’s not worth the extra expense.
If you travel for business, it is almost considered a requirement.

Negative aspects
Noise from other passengers in the cabin
The sound of the carriage
The wrong temperature

The main advantages
To be able to sit and look out through the window
Spend time on your own

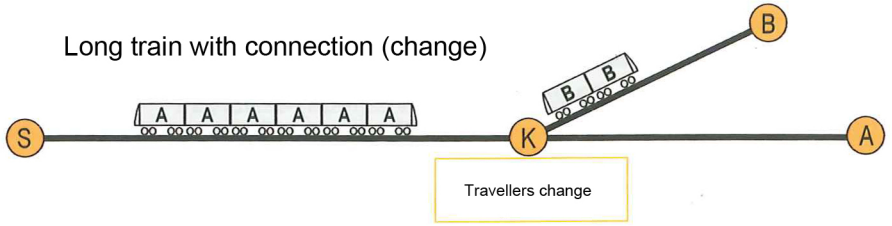
How to spend time
Before bedtime, with pleasure outside the cabin
Read, have coffee, watch a movie.

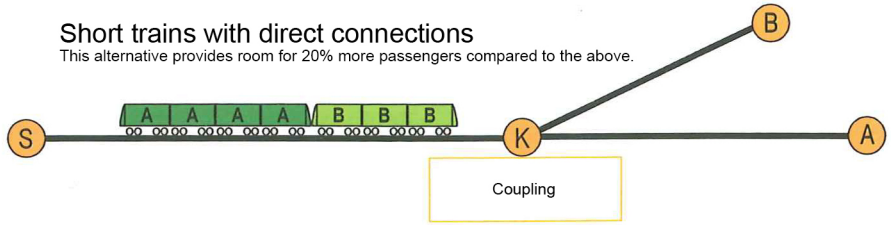
How I want to sleep
In the right temperature
Undisturbed by fellow travellers
Fresh air
Comfortable bed

TRAIN SETS AND CARS

A modern train for passenger transport is often an EMU (Electical Multiple Unit). Such a train consists of two motor cars, one at either end. These cars hold the drive unit, the driver's compartment and some passengerss. Placed between the two cars are cars which are not not motorized and which only hold the functions you wish the train set to have. Some only have seats and lavatories, but there are some which also provide catering and are designed to meet accessibility requirements.

EMU's can be paired with each other for a long train with multiple drive. It provides fast and convenient travel for trains with two different final destinations. At one point the train set will disconnect without the passenger having to change trains, which is convenient.

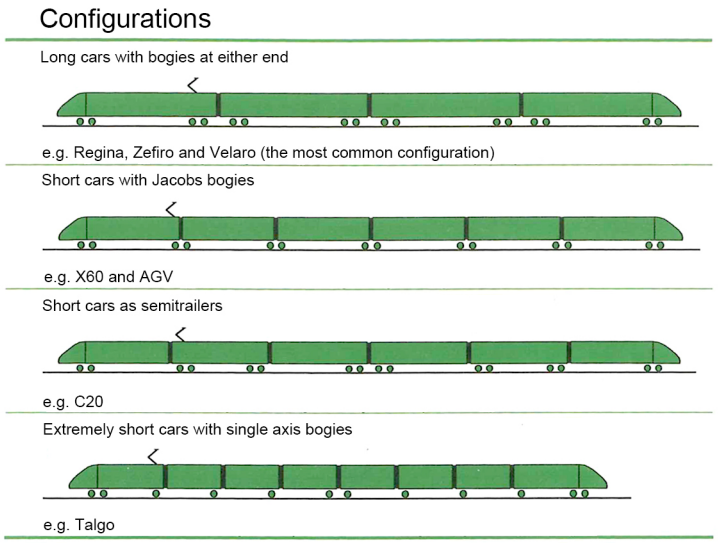




CONFIGURATIONS

The bogies placement and various car lengths provide different advantages and disadvantages. Generally, it can be said that more cars and fewer bogies is finacially more beneficial. It is easier to make effective use of the facilities if it is not split into many smaller parts

Fewer bogies gives a higher axle load, which can be restrictive. A higher axle loads can result in rail fees. All options, with the exception of "long cars with bogies at either end" are difficult to disconnect. This specific configuration is also the most commonly used.



LOCATION OF THE DOORS

The number of doors and their location will relate to the number of seats. Partly it is to optimize passenger flow during boarding and disembarking but more importantly to ensure fast evacuation in case of an emergency due to an accident or fire. A rule of thumb is to not have more than 40 seats per door.

“Personvagnsmodellen” creates the least amount of noise and wind draught for travellers, but there is an increased risk of congestion and it is not possible to have a low floor entrance, and no lift for disabled passengers

With “Kvartsmodellen” and “Mittmodellen” there is an increased risk of noise and draught for travellers, while it there would be less risk of congestion/ queues due to shared feeds. A low floor entrance for disabled would be possible.

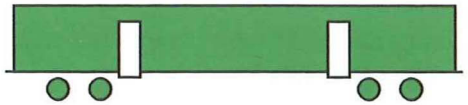
CAR BODY

The narrower continental car body is common in Europe. In the Nordic countries we have the opportunity to drive with trailers that are wider when it is farther distance to the impact surfaces on the tracks.
The greatest advantage with a wide car body is that you can sit five instead of four abreast in what would normally be classed as a 2nd-class seating area. And if one were to choose a wider seat type in first class, it is possible to be seated four abreast instead of three.

In the the Green Train study it is assumed that it will be possible to make thinner walls without sacrificing travelling comfort. It would mean that the width of the inside of the new trains could be 335 cm, which is as much as 59 cm wider than the X2 / SJ2000 which is 276 cm wide. This corresponds with a good margin to an extra seat when a normal seat is about 45 cm wide.
However, it should be noted that the Green Train is narrowing a lot in the lower parts of the car, closer to the tracks, which means that the lower part of the train floor (if there is any) is not as advantageous over the continental car body.

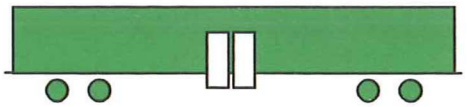
Single doors next to car ends

“Personvagnsmodellen”



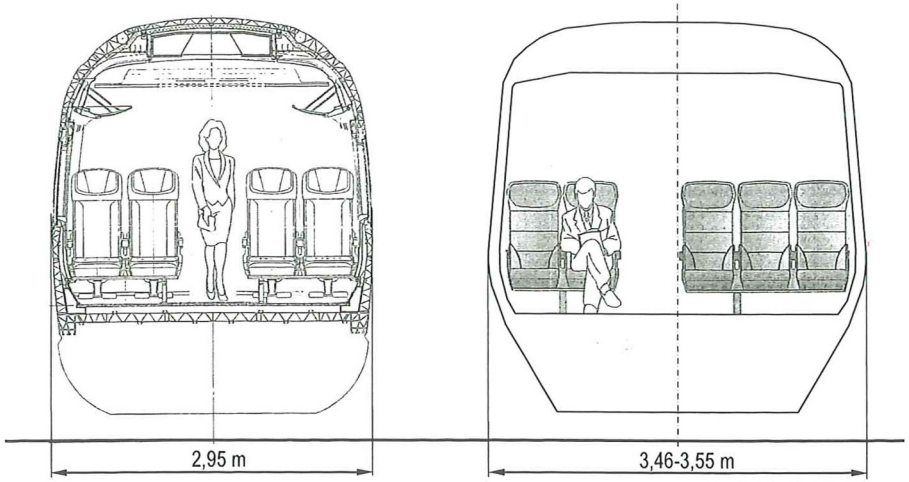
Single doors between the bogies

“Kvartsmodellen”



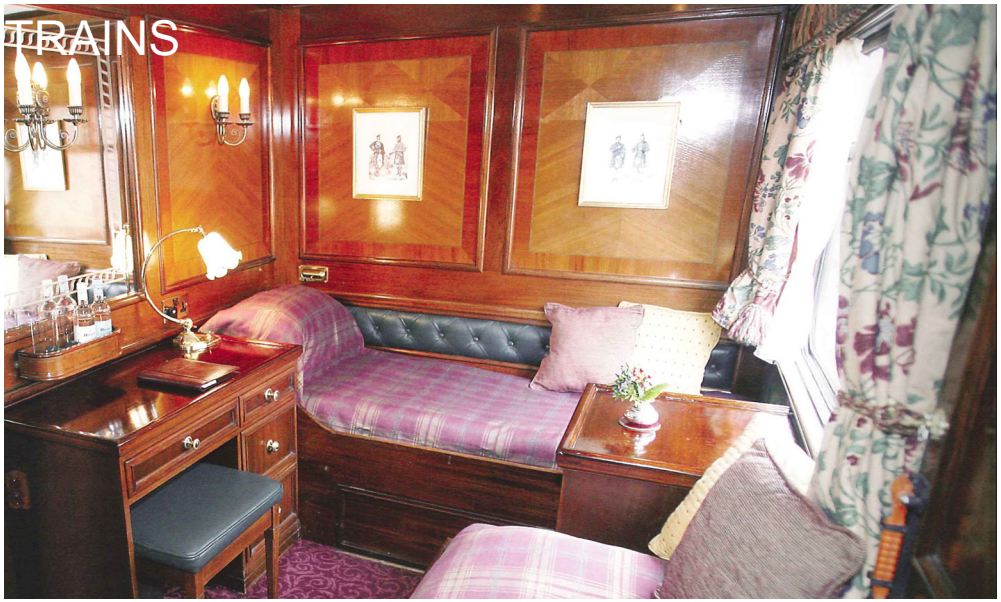
Double single doors in the middle

“Mittmodellen”



ICE3
Normal (continental) car body

Gröna Tåget
Wide car body



Royal Scotsman, Scotland, built 1990.

Rovos Rail, Pullman Suite. South Africa, built 1989.

Eastern Orient Express, Singapore, built 1993.

Railbed, Australia.

NIGHT TRAINS IN USE, SWEDEN/EUROPE

VR. Current Finnish train.

City Night Line. Germany.

VR. The Finnish train.

BC2. Swedish couchette.

NIGHT TRAINS IN USE. SWEDEN

BC4 och BC-T. Swedish couchettes.

WL4. Swedish sleeper.

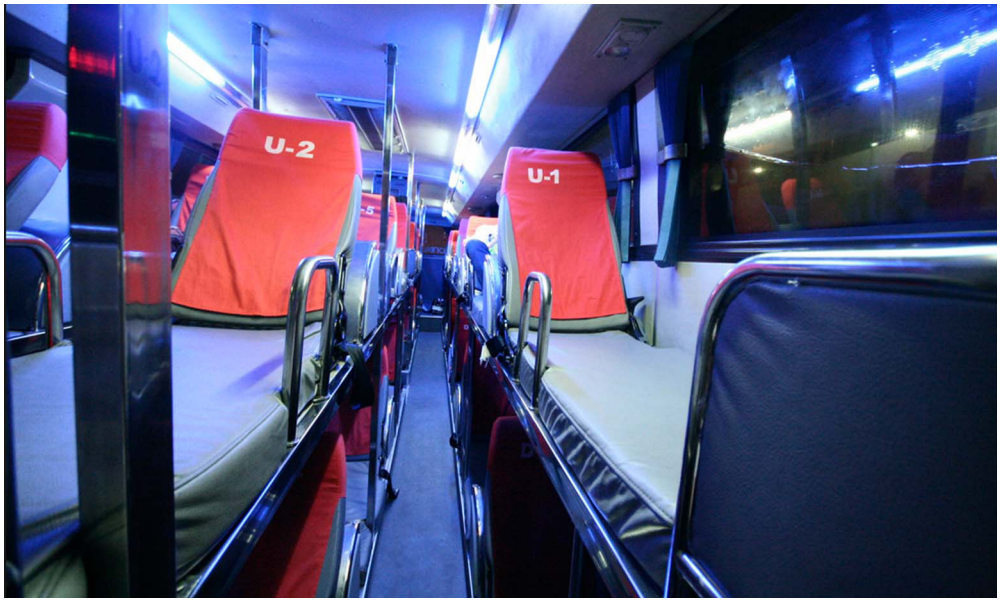
WL1. Swedish sleeper.

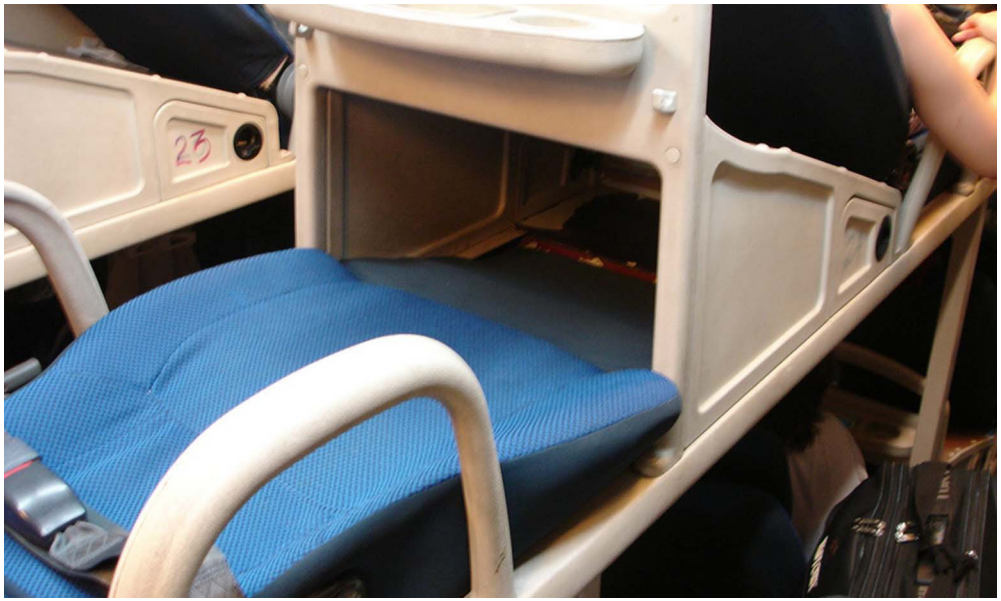
WL5 och WL6. Swedish sleepers.

COACHES

The most suitable configuration is to place the beds along the length of the coach.

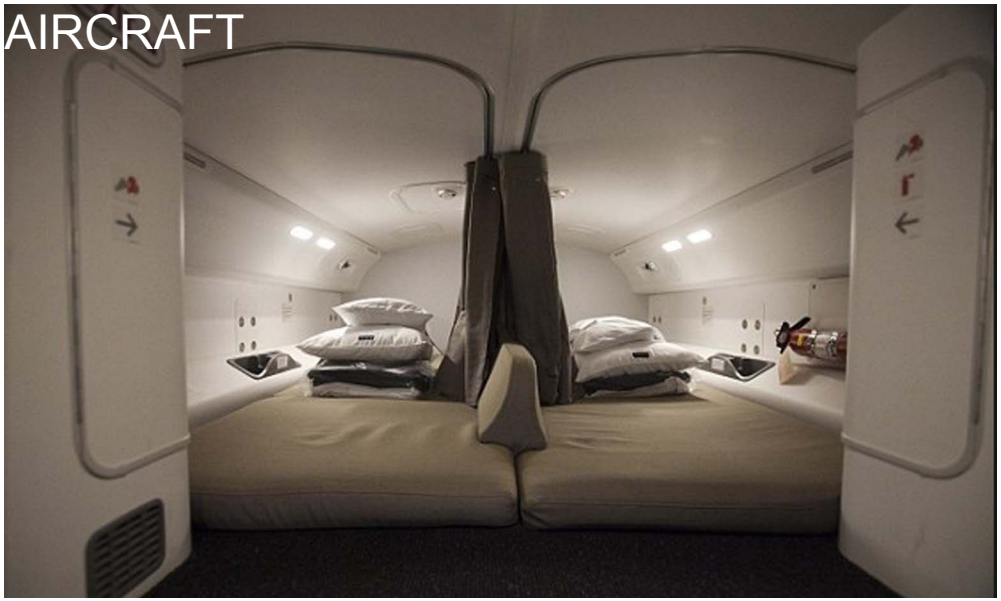
Sit and sleep (trying your best).





Use the space available.

AIRCRAFT



Beds for crew onboard a large aircraft

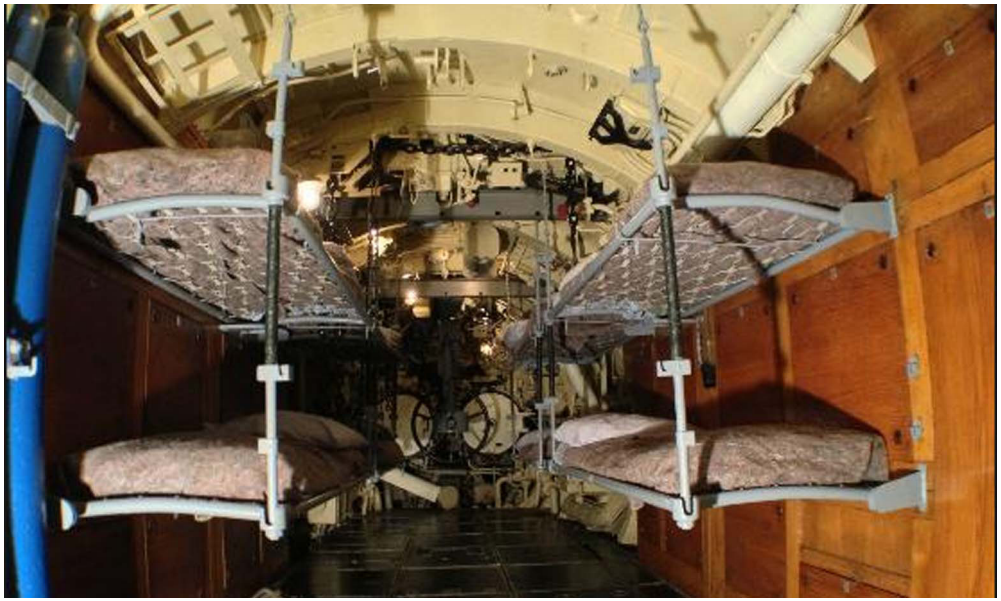
A bed for a business traveller

An option providing extra privacy

Berth onboard a military ship. Compact and providing privacy and seems quite comfortable.

Berth onboard a smaller boat. The space has been maximised. The mattress is shaped by the boat's hull.

A double bed onboard a boat.



Berth onboard a submarine. Basic conditions with basic beds.

HOTELS

The cabin makes you feel close to the surrounding nature

A Pod hotel. Small pods you enter for a night's sleep.

A Sleepbox, Dubai airport

Another pod hotel.

CAMPING

A caravan... a very compact version

Second floor.

When the view is a priority.

SLEEPING ALTERNATIVES

Get into your Ostrich pillow and rest... anywhere.

Get into your private sphere... anywhere.

Support your head and go to sleep... anywhere.

A charming felt pod could be used to take rest in and you could sit and sleep in this device.

FOLDABLE BEDS

Berth, almost invisible.

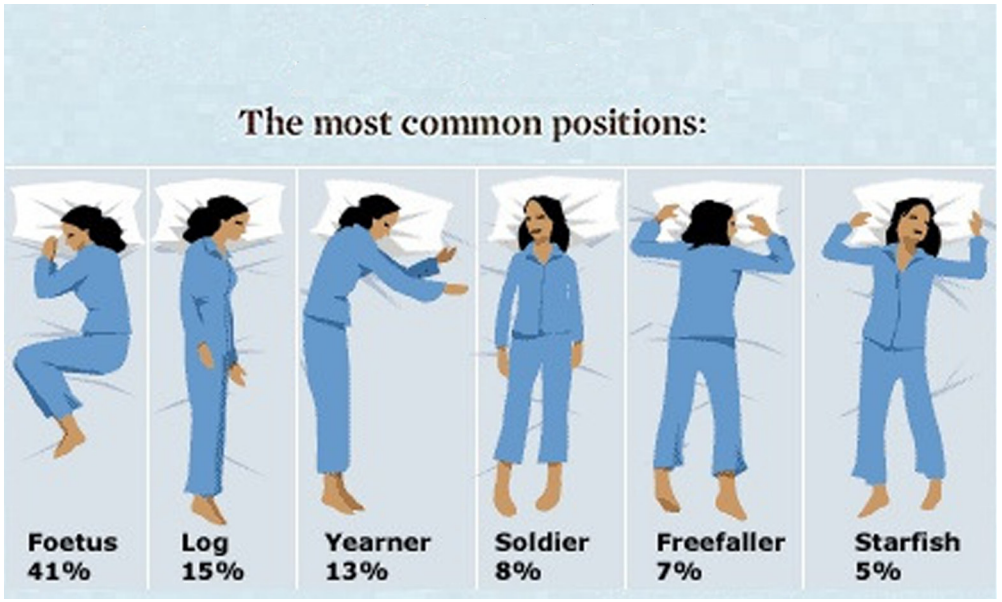
The bed is a ceiling with integrated lights during the day.

A bunk bed with a ladder

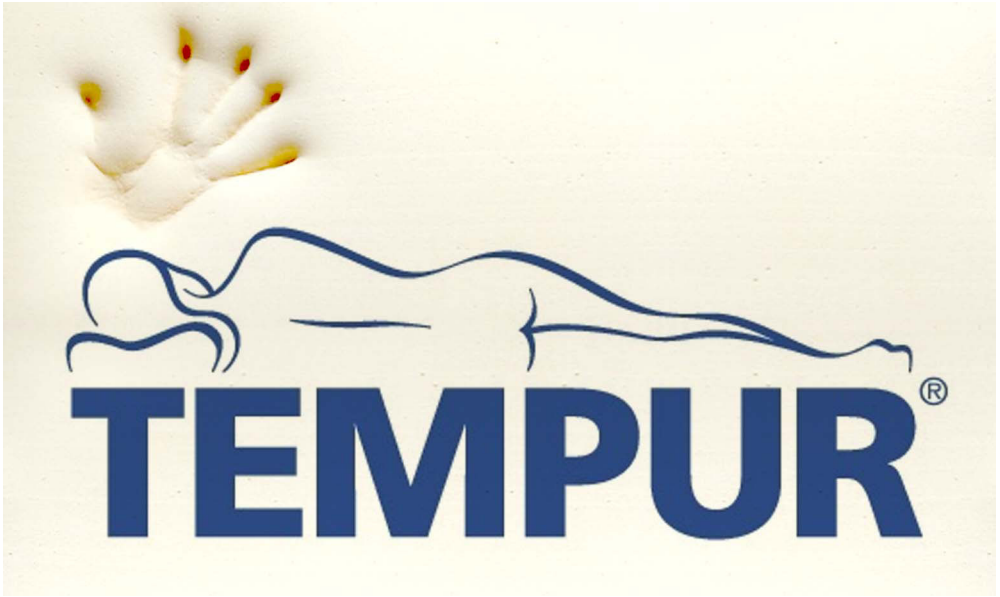
A sofa. The shelf transforms into a supporting leg when the bed is in position.

SLEEPING

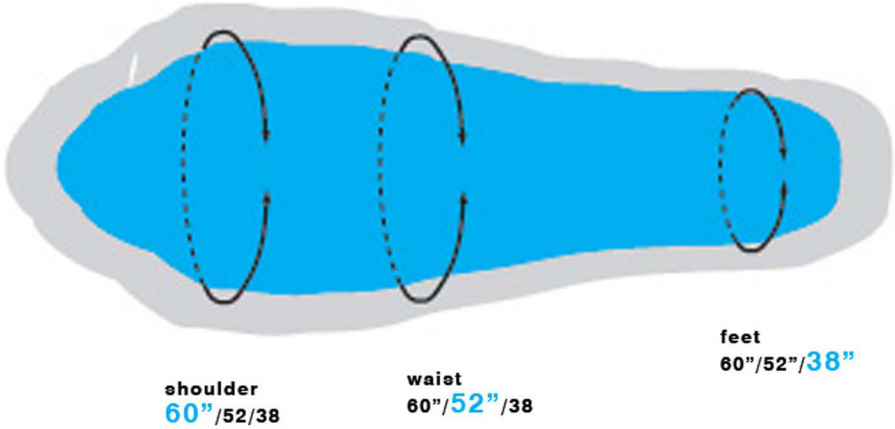
I’ve been in contact with a chiropractor who works as a supporting seller at SOVA. This store offers many solutions for various consumer needs and are not tied to a specific brand. Based on their expertise, a base of cold foam with a top layer of memory foam would be the best solution for these types of beds. The bedding on the train should preferable not be too thick due to space limitations. He suggested five centimetres of cold foam with seven centimetres of memory foam on top for the alternative that would replace the couchette. This would provide great comfort.
To achieve even greater comfort for the more expensive bed alternative he recommended a base of twelve centimetres cold with seven centimetres of memory foam on top.



The various positions we prefer to sleep in.



Tempur. Memory foam which provide even support for your body.



Sleeping bags varies in width depending on body shape and need for movement.

CREATION

GENERAL BRIEF

A modern night train is, according to the Green Train investigation, an EMU (Electrical Mulitple Unit) with a wide car body.

The train will travel long routes at high speeds, and with limited number of stops to get as far as possible in as short time as possible.

The vehicle could consist of three to five cars.

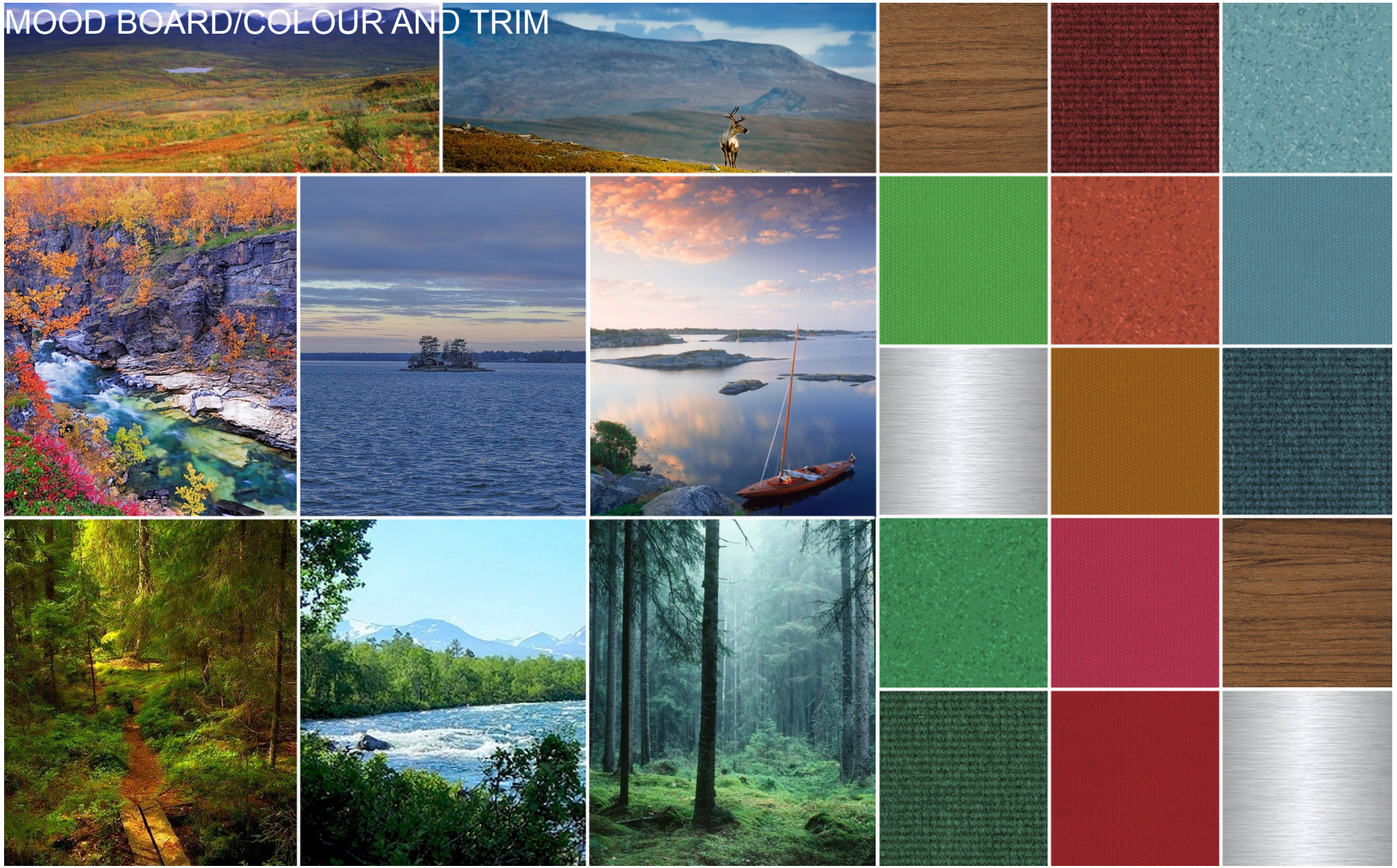
Create a functional layout of a whole train.

The configuration of the train consists of long cars with a bogie at either end. It's a common, well proven and functional configuration. It is a solution that works well with low floors which is something that is important to provide smooth access to disabled travellers. Only one car has a low floor, the other a high floor.
Since night trains do not take as many passengers as regular day trains there could be fewer doors, while still enough doors required for an emergency evacuation in case of an accident. Due to a limited number of stops on the route and with the majority of passengers getting on and off on at the first and last stop of the journey, there is not really an advantage in having many doors.

Creating two different kinds of model standards for travelling, replacing the traditional couchette and sleeper compartment. One standard model to be fitted with a private basin, lavatory and shower. The other model to be of a lower standard, with no access to shower and with a shared lavatory and washing facilities

Also included will be a bistro, a social area, lavatories, washing facilities, an area for disabled passengers and the crew's compartment with lavatory.

MOOD BOARD/COLOUR AND TRIM



Inspired by Swedish nature.

BED CONCEPT - “COUCHETTE”

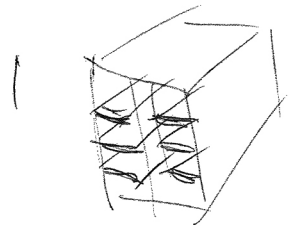
This concept is the cheaper way of travelling with a night train, equivalent to the couchette.
The bed size is first and foremost 80 x 200 cm, but it could also be available in larger sizes. The traveller should not be disturbed by other travellers due to noise, such as snoring or by lights The passengers should not have to take other passenger’s choices, like bed times, into consideration when deciding how to spend their time onboard the train.
The concept should facilitate a good and secure solution for storing luggage, so that the passengers will feel it is kept safe during the journey.
The concept should offer the traveller a nice travelling experience, by offering a comfortable bedding solution, and a the opportunity to spend quality time alone or together with other people.

FUNCTION ANALYSIS - SLEEPING AREA

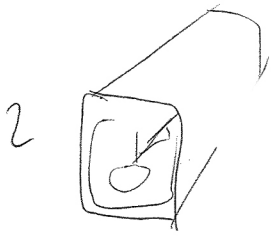
Offer	Sleeping facilities	M	Comfortable sleeping (bed size 80x200 and if wider versions 120-140x200)
Offer	Non disturbance	N	Noise, light
Offer	Privacy	N	
Facilitate	Clothes and shoes handling	D	
Facilitate	Garbage handling	D	Strategically placed
Offer	Bagage handling	D	Strategically placed
Offer	Seating	D	Work and leisure
Facilitate	Value	N	Great travelling experience

M=Main function, N=Necessary function, D=Desirable function

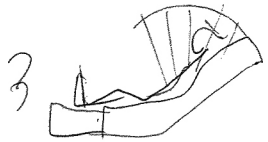
WHAT KIND OF “ROOM/SPHERE”?



A room with beds.
You share the room with other passengers, either people you know or strangers, like you do in a couchette. Even though you might be able to screen off from the other passengers it does not meet the set objectives. You still share the space and will to some extent have to consider other passengers. No, this is not the solution.

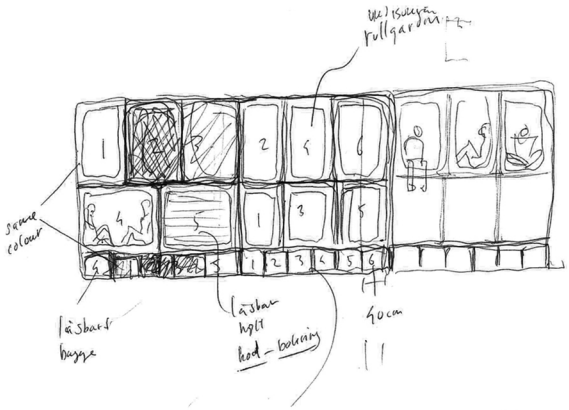


Your own private room.
If you could screen off from light and noise and have access to a thermostat for the temperature this could be a good solution.
This is worth investigating.

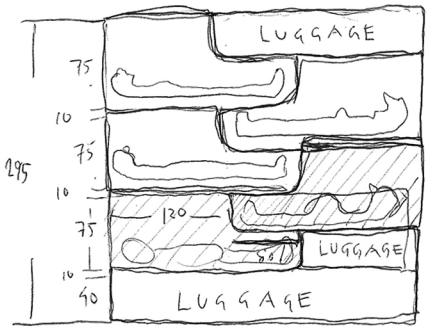


Some kind of private sphere situated in a larger space which you share with other passengers.
Even though you might be able achieve quite a bit of privacy you are still sharing a larger room and it will be difficult to reach the objectives. No, this is not a first choice.

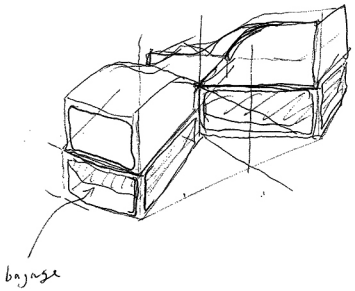
HOW TO PLACE “IT” IN ITS CONTEXT



Beds positioned across the width of the cars.
If you are lying down (which you should to get a good night’s rest) one person will fit the width of the car body, the space you have got left is enough for an aisle, but no more. It is similar to today’s couchettes. The extra width of the car will not provide more opportunities.
It could be a solution. (Concept A)



Beds positioned along the length of the cars.
If you are lying down two persons will fit the width of the car body. The space you are left with is enough for a generous aisle, preferable placed in the centre.
It is a possible solution. (Concept B)



Beds placed diagonally.
It might be a possible solution but it is difficult to use the space efficiently. You do not gain space by rotating a rectangular shape though its diagonal is longer than its sides. The aisle would also be really messy. I skip this route stick to the other ones. Keep it simple.

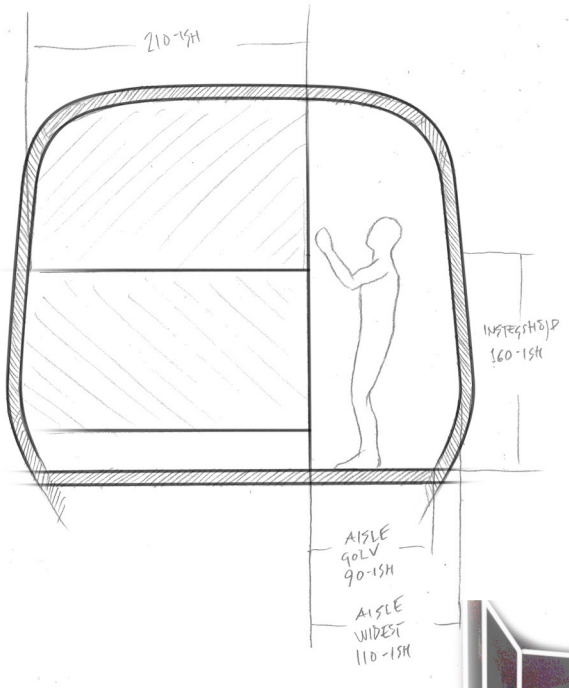
CONCEPT A - PROCESS

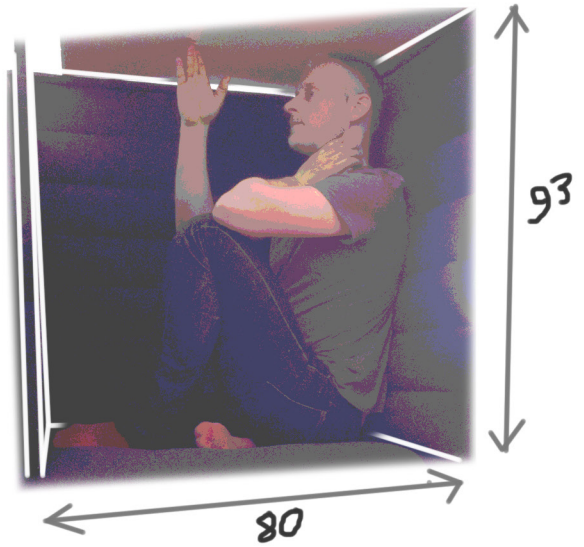
+ Visual contact through windows on both sides of the train, the window in your pod and the window opposite the aisle.

+ Having no beds opposite the aisle will reduce the risk of being disturbed by other passengers.

- You enter the pod from its smallest side. It might be a bit narrow to enter.

- Aisle by a car body side which is not optimal, though the connection between cars is centred. That makes it more difficult to make the best use of the space.

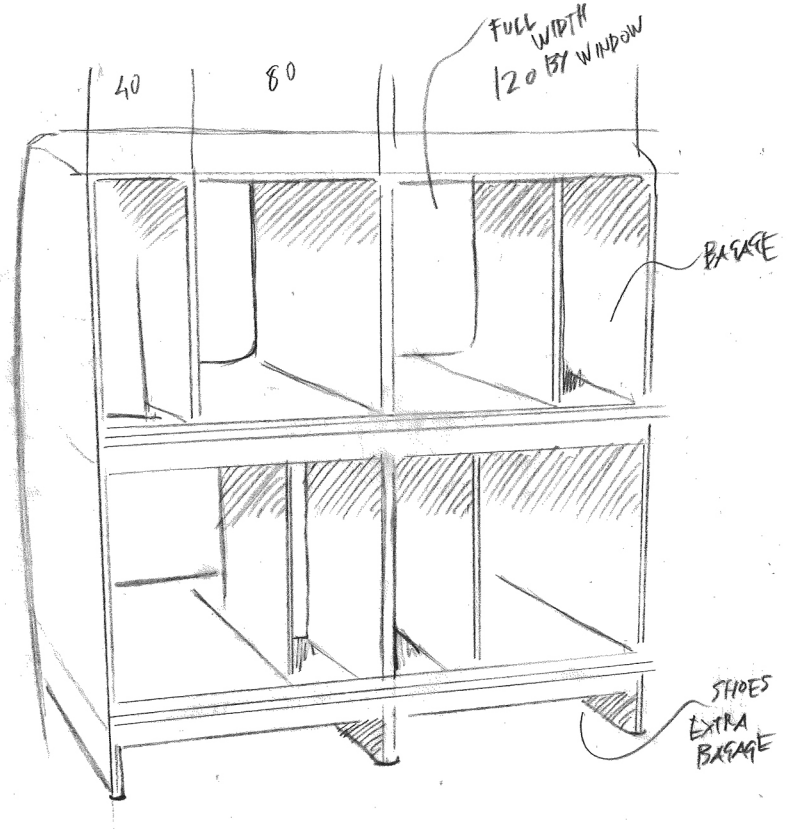




To sit comfortably in this pod you would need around 100 cm in width and the height to be a minimum of approximately 95 cm.
(I am a 95 percentile man)

CONCEPT A - PROCESS

THIS CONCEPT I BASED ON THE CONCLUSION
THAT IT WOULD NOT BE NECESSARY TO PROVIDE
AN ASSIGNED SEAT FOR PASSENGERS.



NUMBER OF BEDS PER 10 METRES OF TRAIN:
80 WIDTH: 1,29 m per module/2persons= 15,5 person/10 m of train
120 WIDTH: 1,59 m per module/4 persons = 25,2 person/10 m of train

A pod which you enter from the short side.

Luggage to be stored beside the entrance to the bed.

Total width of one unit: about 125 cm.

Storage by the floor for shoes and tall items (but taller items might be a bit tricky to get in and out)

Would it be difficult to turn around in the pod?

Would it be difficult to reach to the top bed without disturbing the passenger below - where and what is the “ladder”?

A nice place in the front of the pod, closest to the window where the pod has the full unit width.

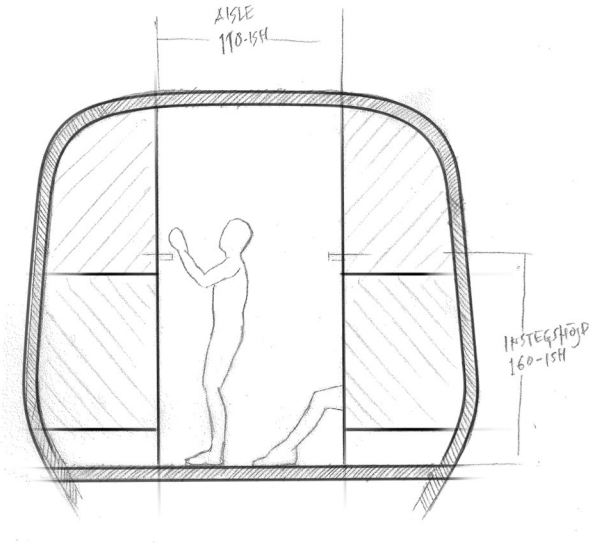
CONCEPT B - PROCESS

+ You enter the pod on its wide side, which makes it easy to get in.

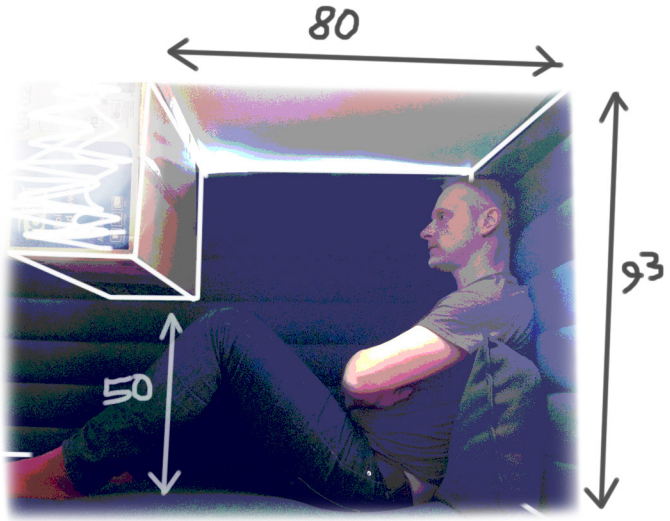
+ Aisle in the middle of the car body which is optimal though the connection between cars is centred. That makes it easy to make the best possible use of the space.

- No direct visual contact through windows on the other side of the aisle, just through your own large window. You might be able to look through the pod opposite the aisle.

- Beds opposite aisle. You might be disturbed by other passengers.

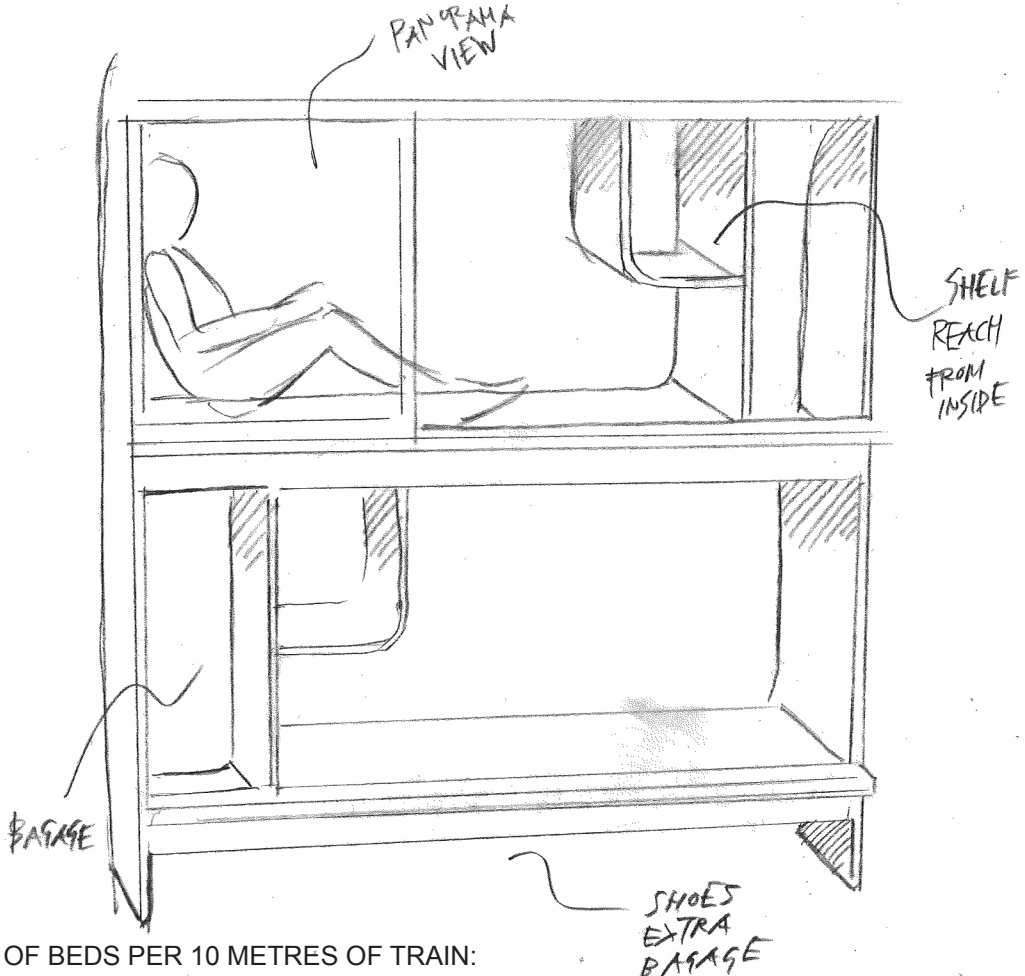


In the case of storing a volume (luggage etc) inside the pod it must be positioned so there is a 80 cm space left in front of you and 50 cm above the bed.
(I’m a 95 percentile man)



CONCEPT B - PROCESS

THIS CONCEPT I BASED ON THE CONCLUSION THAT IT WOULD NOT BE NECESSARY TO PROVIDE AN ASSIGNED SEAT FOR PASSENGERS.



A pod you enter from the longer side.

Luggage stored by the bed.

Total width of one unit: about 250 cm.

Storage by the floor for shoes and tall items.

Would it be easy to get in and out of the pod?

How would it be possible to reach the top bed smoothly?

It gives a feeling of being airy as it is close to the large window and near the exit.

NUMBER OF BEDS PER 10 METRES OF TRAIN:
80 WIDTH: 2,5 m per module/2persons= 16 person/10 m of train
120 WIDTH: 2,5 m per module/6 persons = 24 person/10 m of train
(can't have wide (120) beds on both side of aisle, the aisle would be too narrow.)

SELECTED - CONCEPT B

Concept B is preferable due to:

Easier to have a centred aisle matching car ends.

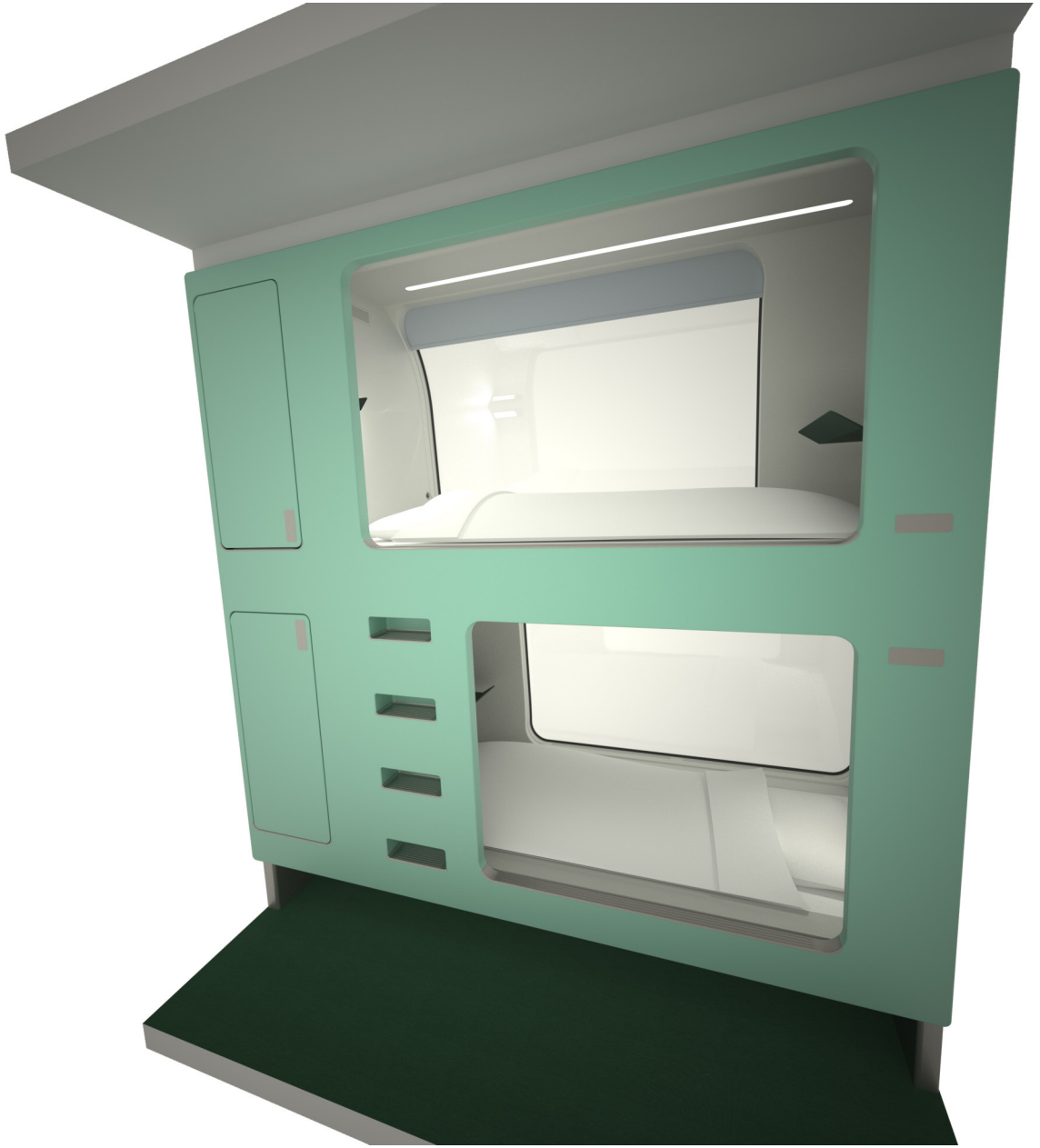
Concept A with 80 cm wide beds feels too narrow.

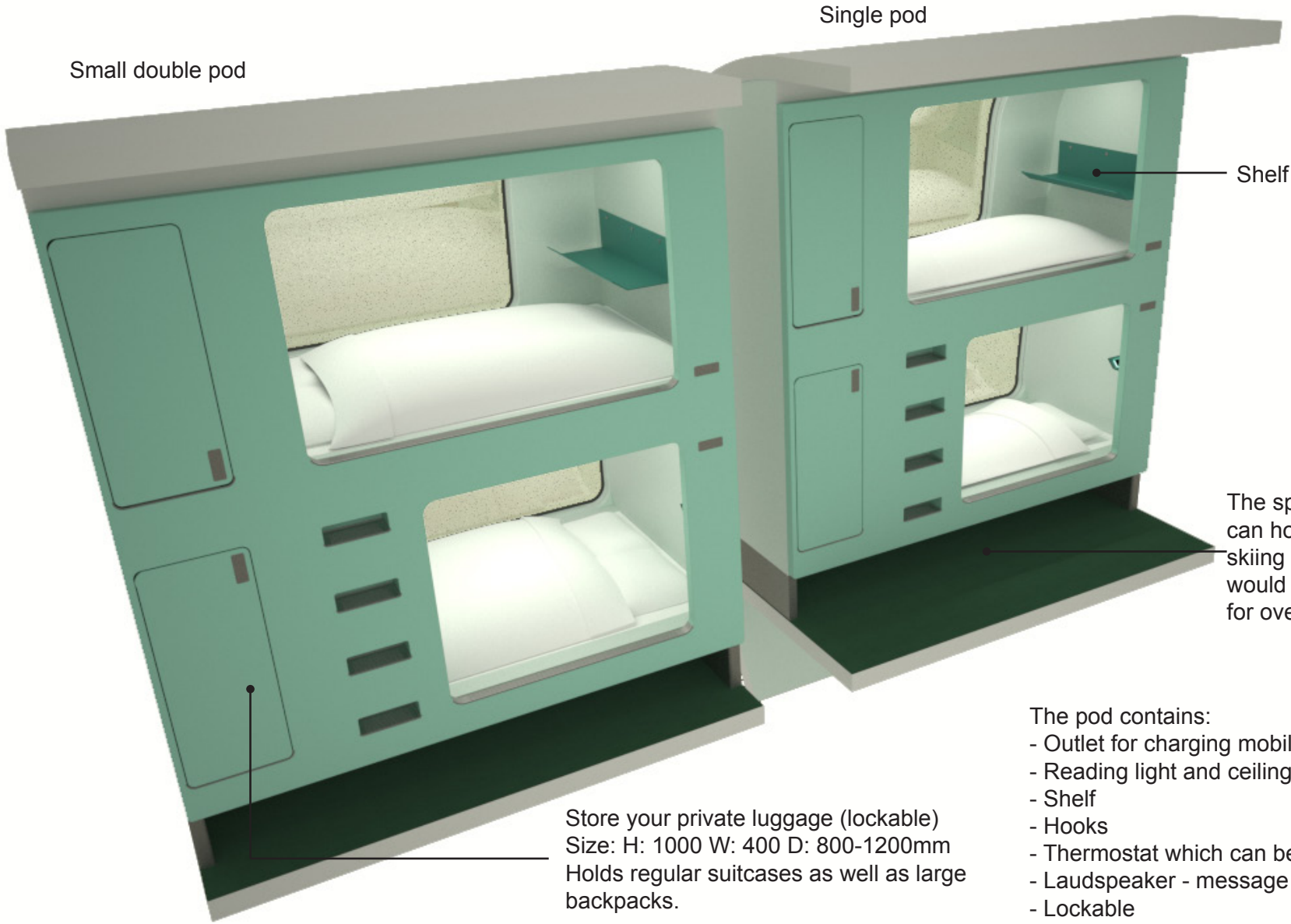
Concept B feels more airy.

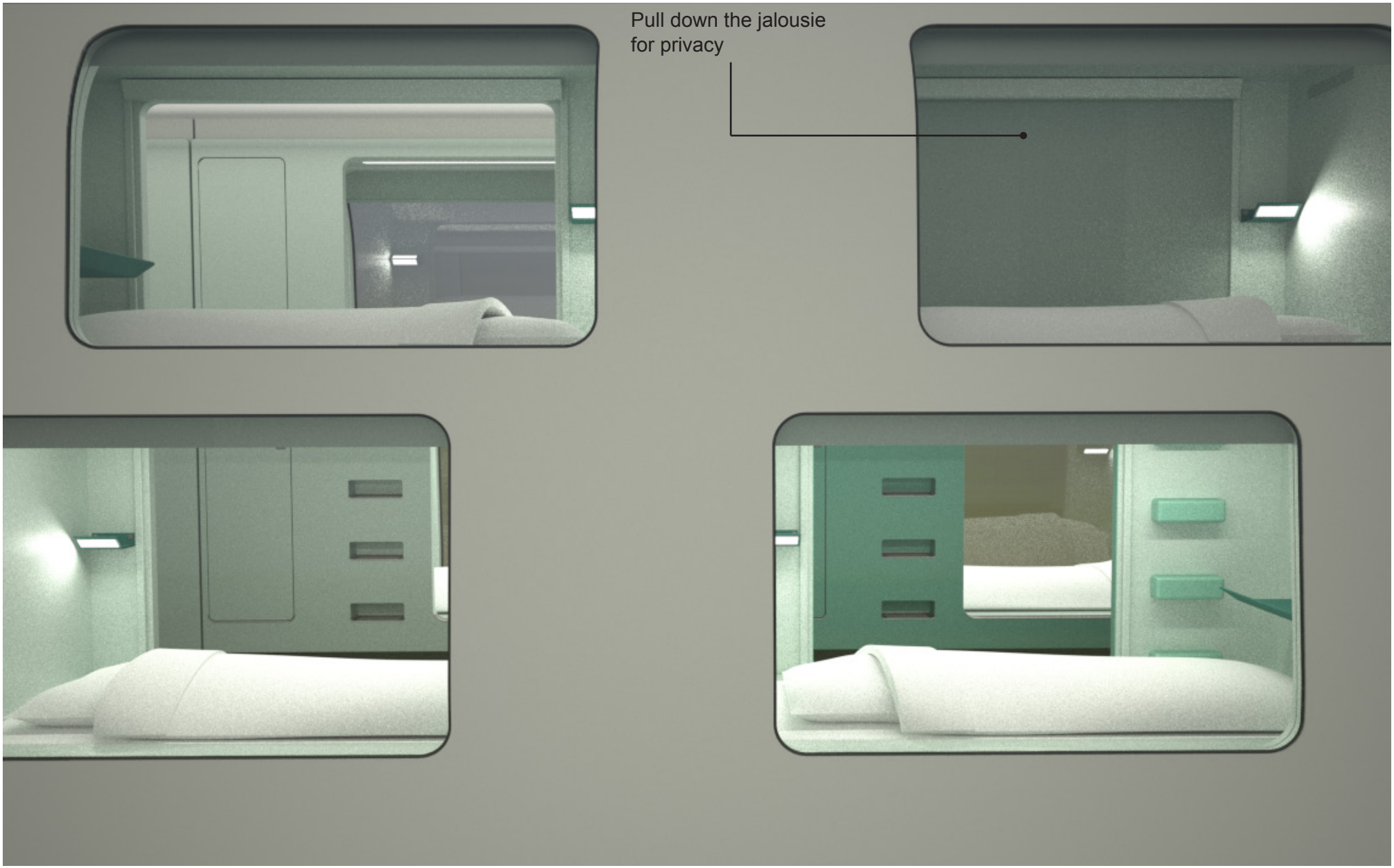
Concept B provides more space for shelves etc inside the pod.

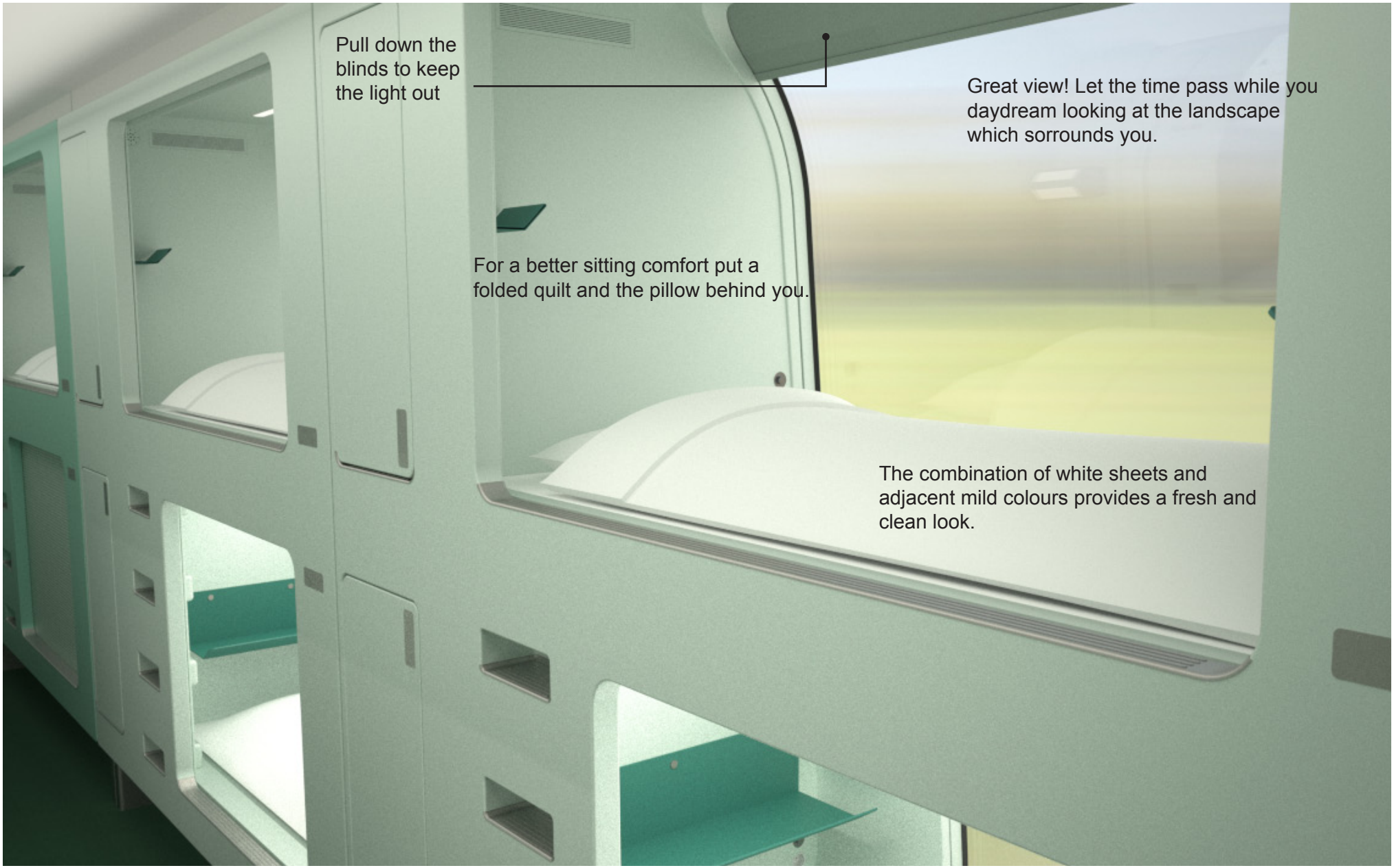
Integration of a ladder is easier with Concept B as it provides more space for where to fit it.

Easier to store tall items on the floor with Concept B cause the long side is facing outwards.




Single pod
Small double pod
Shelf
The space next to the floor can hold tall items such as skiing equipment. The space would also be recommended for overnight shoe storage.
Store your private luggage (lockable)
Size: H: 1000 W: 400 D: 800-1200mm
Holds regular suitcases as well as large backpacks.
The pod contains:
- Outlet for charging mobiles etc.
- Reading light and ceiling light
- Shelf
- Hooks
- Thermostat which can be adjusted from inside
- Laudspeaker - message from the crew
- Lockable

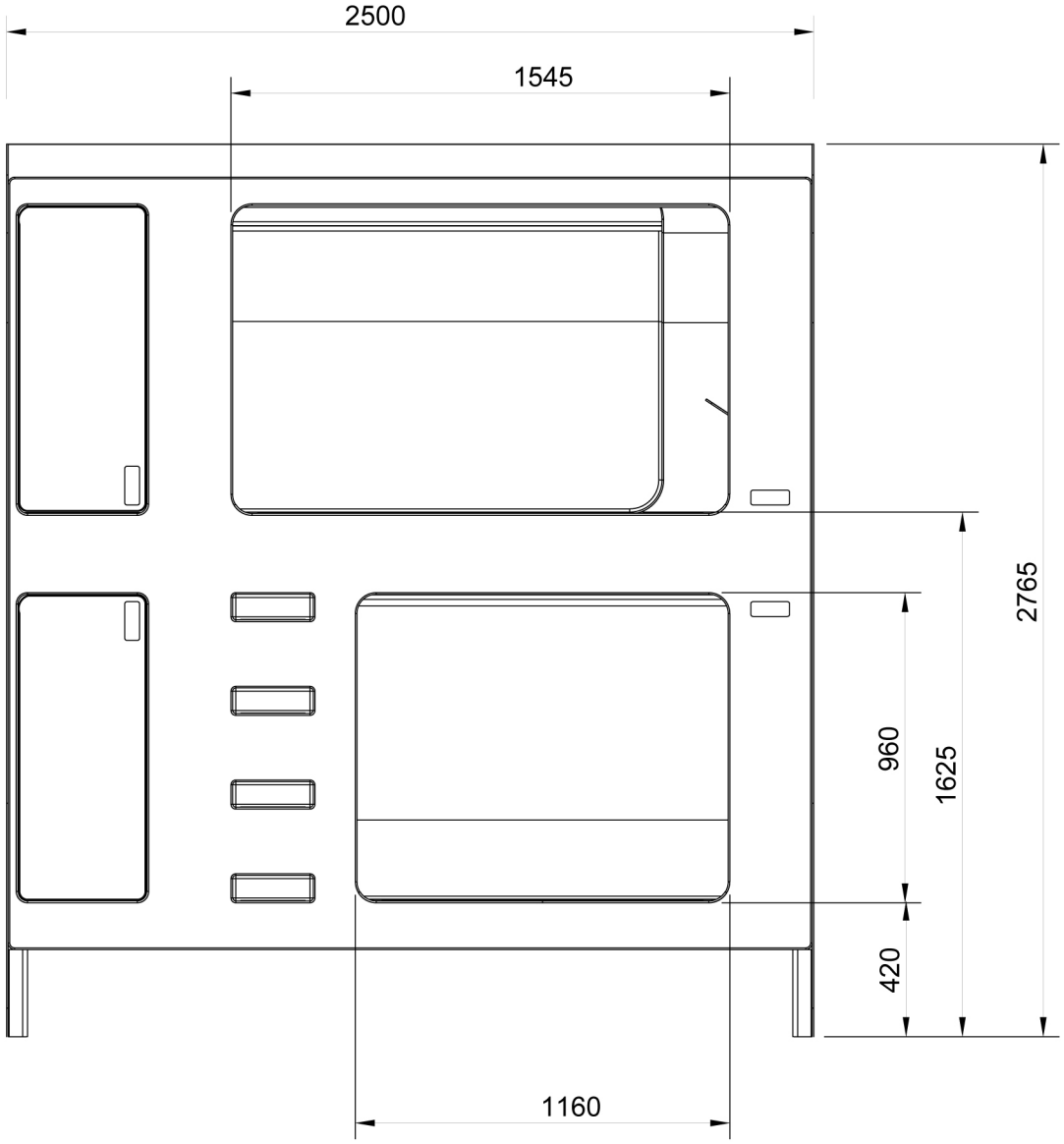

Pull down the jalousie
for privacy


Pull down the blinds to keep the light out
Great view! Let the time pass while you daydream looking at the landscape which sorrounds you.
For a better sitting comfort put a folded quilt and the pillow behind you.
The combination of white sheets and adjacent mild colours provides a fresh and clean look.

Pull down the jalousie to get total privacy. The jalousie absorbs most of the noise from the aisle.

An integrated ladder with an anti-slip surface to reaching the top bed, integrated to eliminate the risk of passengers getting caught on it while passing in the aisle.

DRAWING



BED CONCEPT - “SLEEPER”

This way of travelling is the one most closely associated with a fully featured sleeper: a better bed, private lavatory and showers which you can reach without leaving your room. It offers seating in a quiet environment when travelling during non-sleeping hours.
It should provide room for at least two persons in separate beds, preferable with one wider bed to make it easier travelling with children.

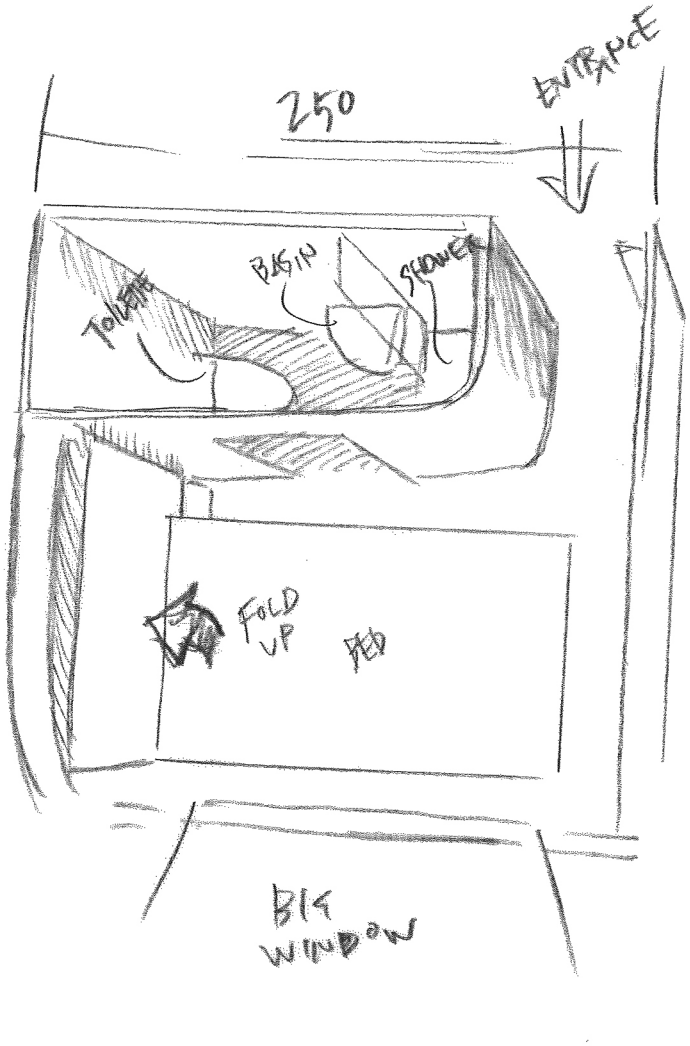
Could it be squeezed in a 2500mm module, the same module width that was used for the “couchette”?

FUNCTION ANALYSIS - SLEEPING AREA WITH PRIVATE RESTROOM AND SHOWER

Offer	Sleeping facilities	M	Comfortable sleeping for 2-3 people
Offer	Hygene facilities	M	Private lavatory and shower
Offer	Privacy	N	
Offer	Non disturbance	D	Noise, light
Facilitate	Clothes and shoes handling	D	
Offer	Bagage handling	N	Strategically placed
Offer	Seating	N	Work and leisure
Facilitate	Value	D	Great travelling experience

M=Main function, N=Necessary function, D=Desirable function

CONCEPT A - PROCESS



Main idea:
Having the washroom situated as far back in the room as possible provides full access to the view through the window, fitting it in a 250 cm wide module.

+ Large window

- Fits only one bed, a large bed, but just one.

So this will not match the objectives.

CONCEPT B - PROCESS

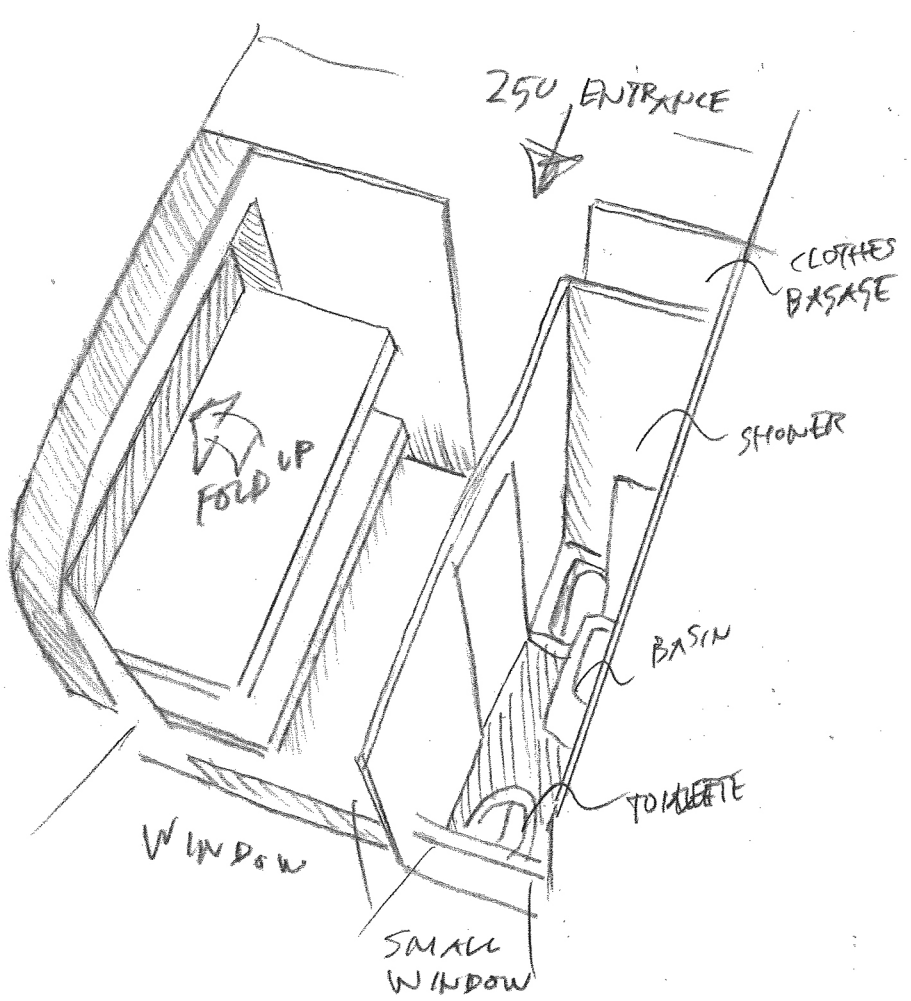
Main idea:
Having the washroom on the side provides more wall surface for beds, fitting it all in a 250 cm wide module.

+ Fits two beds

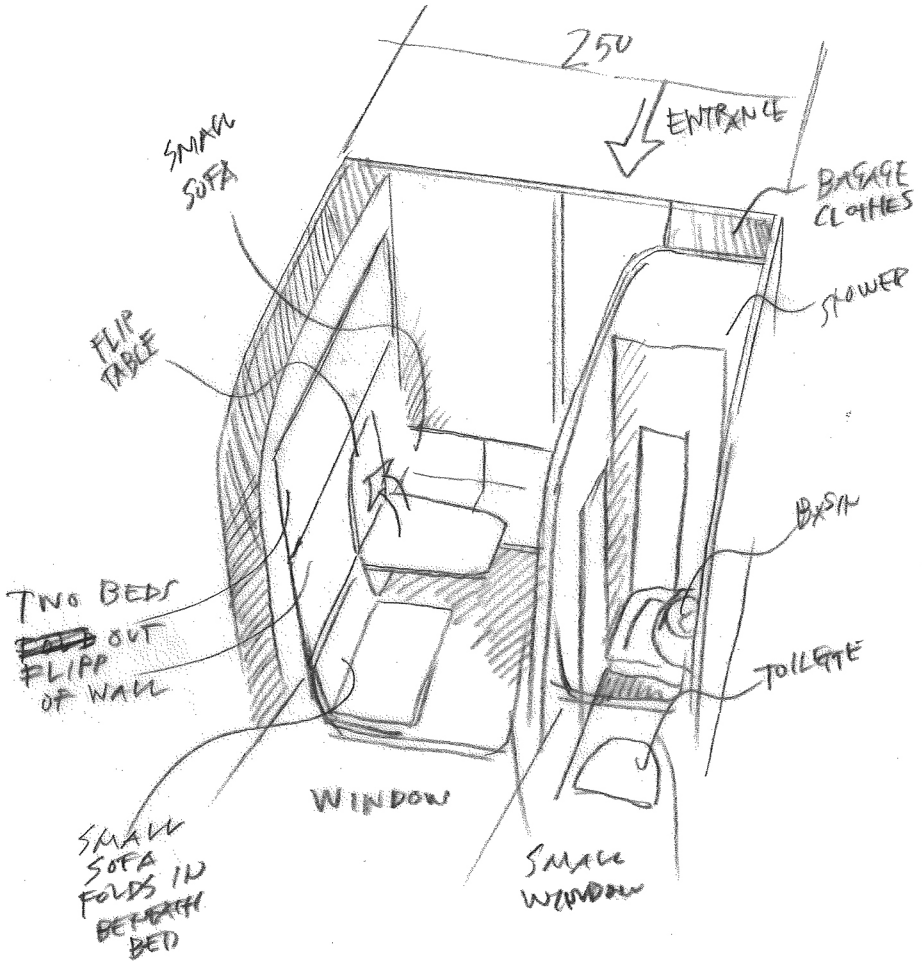
+ Natural space for bags and outer garments etc.

- A smaller window.

This is the best solution of the two, so I will continue to refine the concept.



CONCEPT B1 - PROCESS



A ladder could be stored in 80 cm bed.

+ 120 cm bed and 80 cm bed!

+ The sofa folds away by itself when 120 cm bed is folded out - or manually.

+ The table is a part of the base of the bed but could be folded away.

+ You could sit in two directions

+ You could sit while the 80 cm bed is folded out

- The top of the back rest might stick up when bed is folded down.

CONCEPT B2 - PROCESS

The ladder could be stored in 80 cm bed

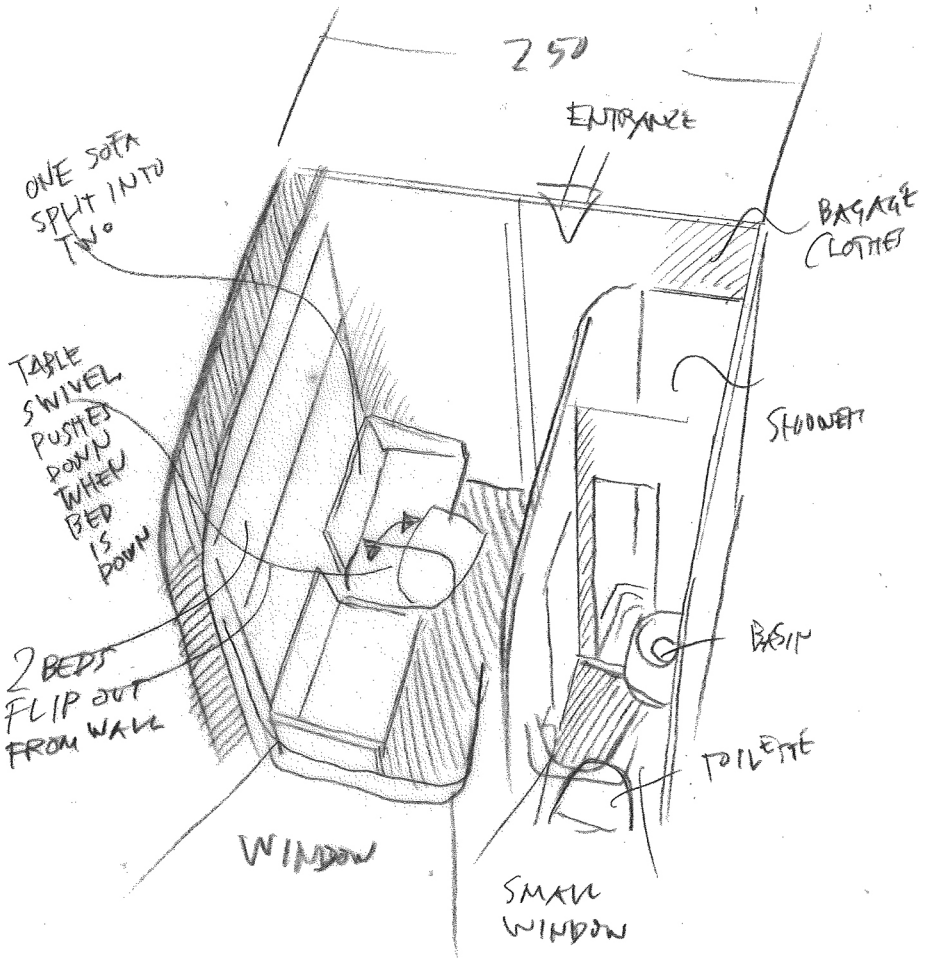
+ 120 bed and 80 cm bed!

+ The sofa folds away automatically when 120 bed folds down

+ The table is pressed down by bed when it folds down
and rises automatically when the bed is folded out, or you
do it manually.

+ The table could swivel around, making it suitable for different kinds of activities.

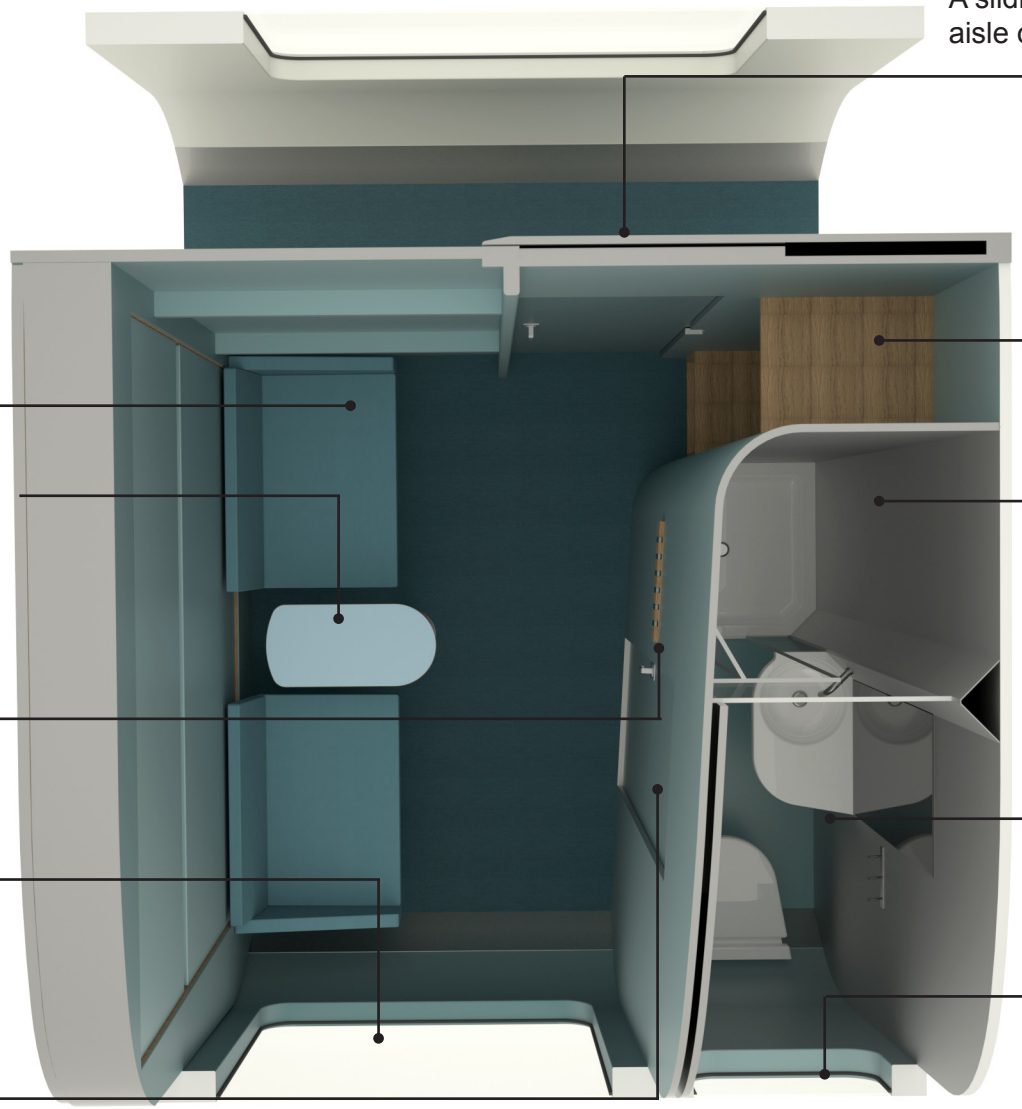
- Only a standard sitting position in one direction.



SLEEPER - DAY MODE

CONCLUSION

The functions in the concepts are pretty equal. The preferred solution is concept B2 due to a more uniform design.



A sliding door will not interfere with the aisle or the compartment.

Jackets, suitcases etc.

A sofa which split into two big easy chairs..

Shower 67x67.

A table which swivels and which can be used with a laptop or for refreshments.

Basin, mirror, hangers and lavatory seat.

Hooks for clothes

A window which cover almost the entire wall, with a view to the passing landscape outside.

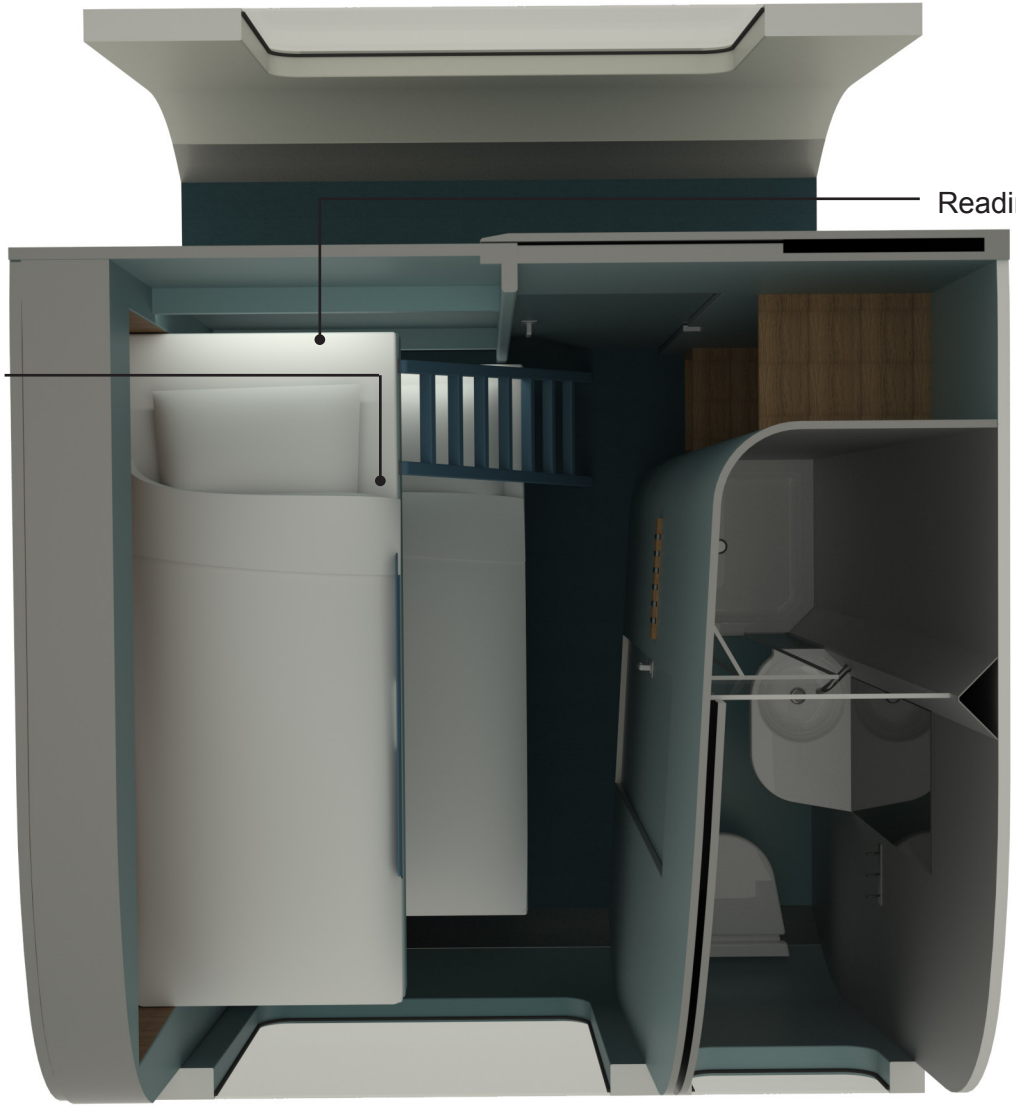
A window, highly placed, to bring some daylight into the washroom.

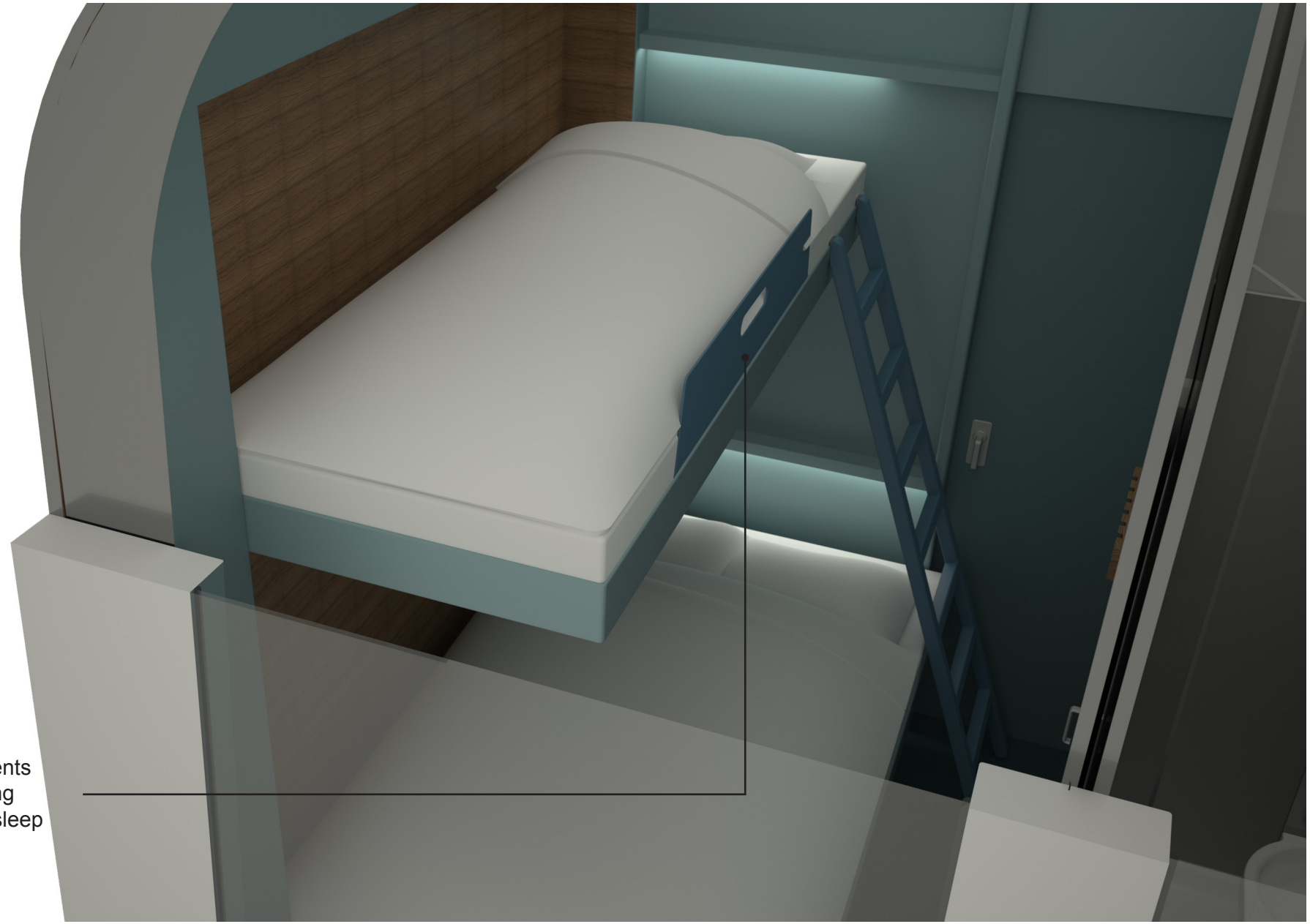
A sliding door to enter the washroom will not interfere with the room space.


The beds, intergrated into the wall.

SLEEPER - NIGHT MODE

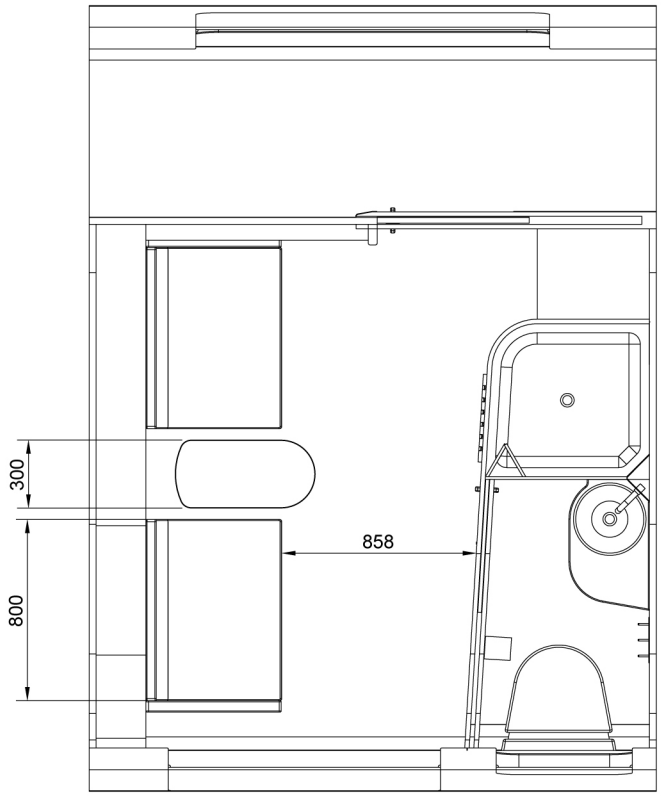
Two beds can be folded out. There is a small double (120 cm in width) and, if required, a regular 80 cm wide bed on top which you reach by using a ladder which is placed in the top bed.
You could also use the space the opposite way by preparing the top bed and keep the sofa below.



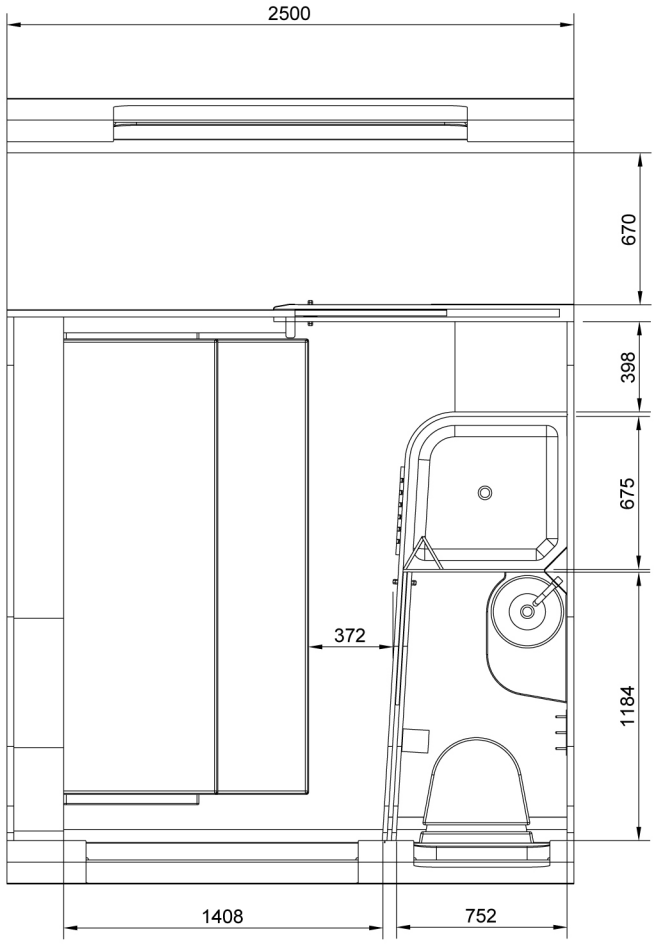


A board prevents
you from falling
down during sleep

DRAWING



DAY MODE



NIGHT MODE

LAYOUT

This is an EMU (Electrical Multiple Unit) with a wide car body, as they recommend in the Green Train study. I have used the most common configuration of cars and bogies, “long cars with a bogie at either end”.
It is good solution and one that works well with a low floor, which I think is important. It enables disabled passengers to get on and off the train without requiring assistance.

The location of the doors are not aimed at increasing the flow of passengers getting on and off the train, , but are evenly spaced to ensure even usage. Being a night train it will not hold as many passengers as as a regular train so one door per car is sufficient, also in a emergency situation.
The train consists of one car with low floor to ensure accessibility for disabled passengers To have a low floor in each car would not be a good solution as you would then require steps by each bogie. A raised floor do provide a wider car body at floor height (see the cross section of car body) which in many situations is preferable.

The train consists of three to five units, depending on how many people would be travelling. A three train unit it will consist of two end cars and one with low floor (car A,C,D according to my layout). This will ensure that all necessary facilities are included in the set. The additional car of the four car unit will ensure that there are capacity for many passengers.

The whole train is based on modules to simplify production. Using more of the same parts will reduce the cost of production. I have come up to a module width of 2500 mm as the base. Next to the car ends and doors there are half modules or 1/4 of a module.

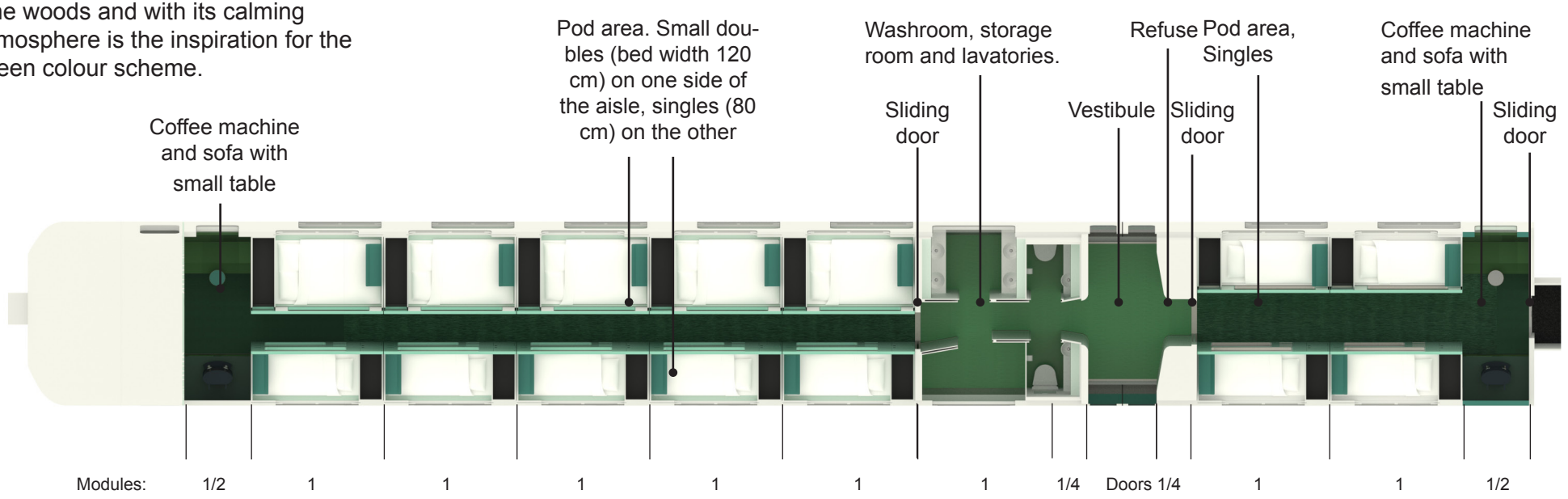
FUNCTION ANALYSIS - LAYOUT OF THE TRAIN

Offer	Accessibility	M	Facilitate for staff and traveller
Offer	Hygene facilities	N	Restrooms for travellers regardless of three or four cars. One restroom only for staff
Facilitate	Garbage handling	N	Strategically placed regardless of three or four cars
Facilitate	Bagage handling	N	Strategically placed regardless of three or four cars
Facilitate	Social meetings	D	Strategically placed, for groups, pairs and single travellers
Offer	Serving	N	Food, drinks and snacks
Offer	Sleeping areas	N	Strategically placed
Facilitate	Value	D	Great travelling experience

M=Main function, N=Necessary function, D=Desirable function

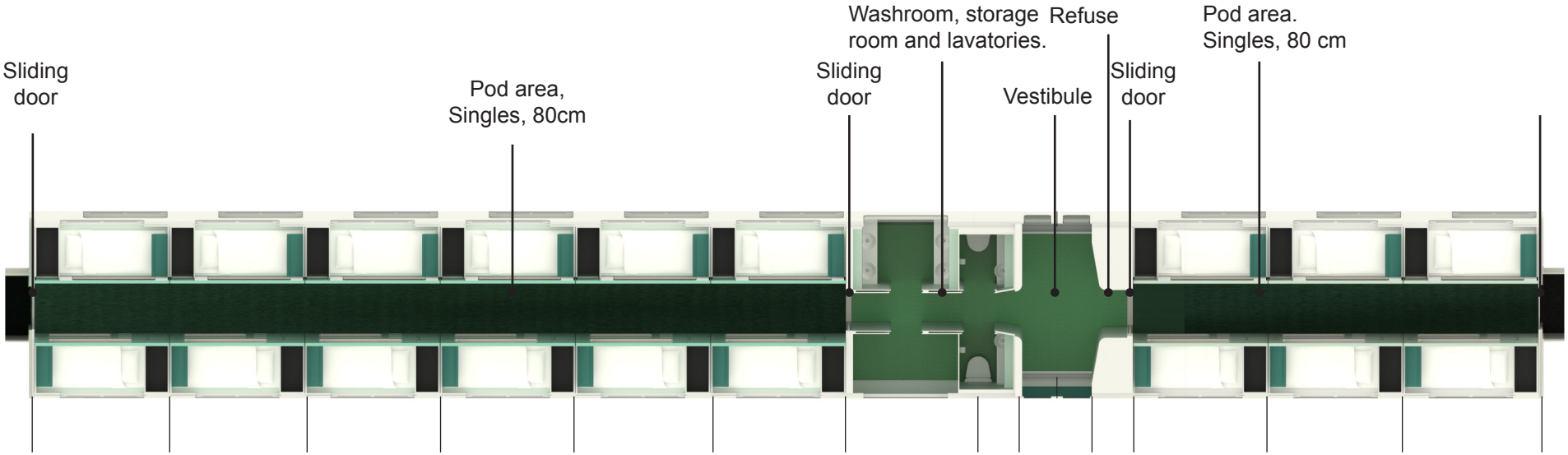
LAYOUT - CAR A

Car A & B are sleeping areas.
The woods and with its calming atmosphere is the inspiration for the green colour scheme.

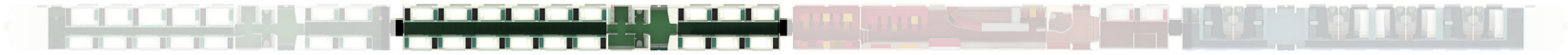


CAR:
Single beds: 18
Small doubles: 10

LAYOUT - CAR B

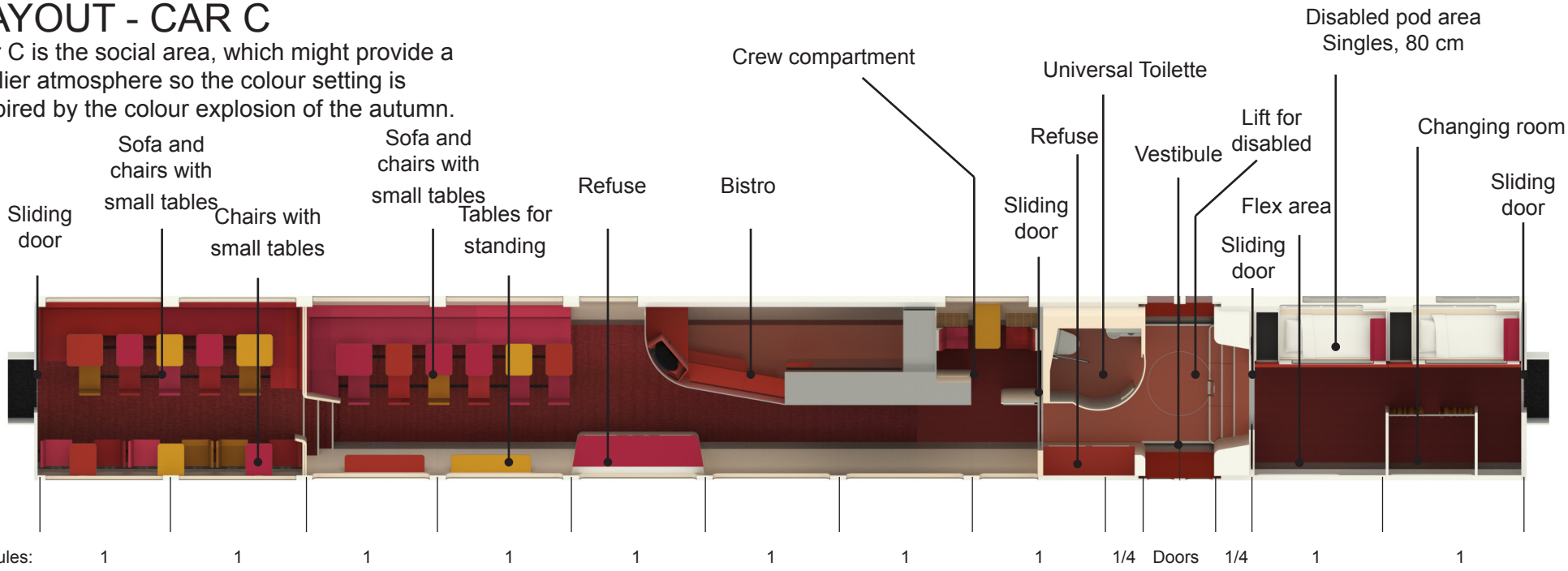


CAR:
Single beds: 36



LAYOUT - CAR C

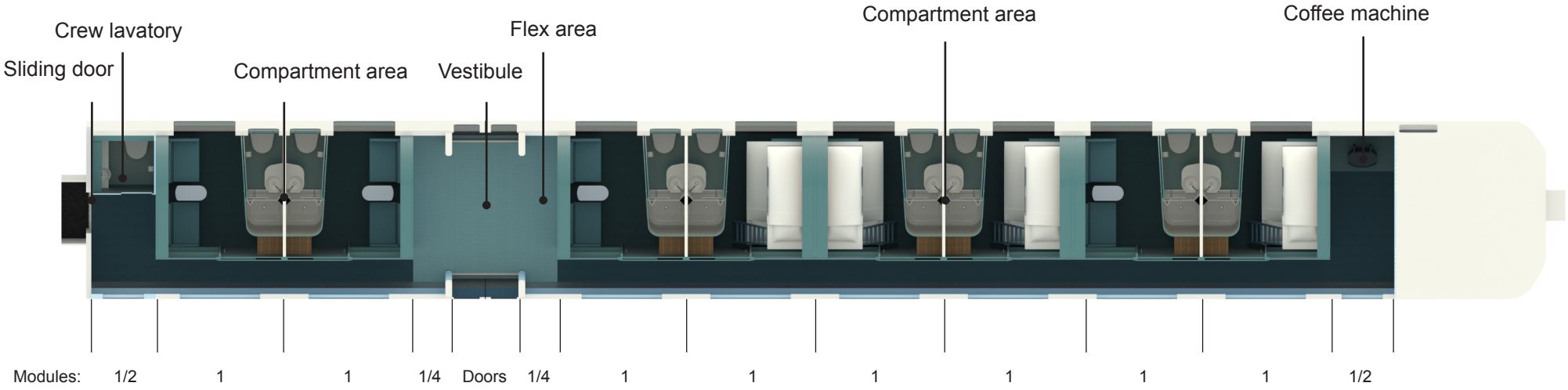
Car C is the social area, which might provide a livelier atmosphere so the colour setting is inspired by the colour explosion of the autumn.



CAR:
Single beds: 4

LAYOUT - CAR D

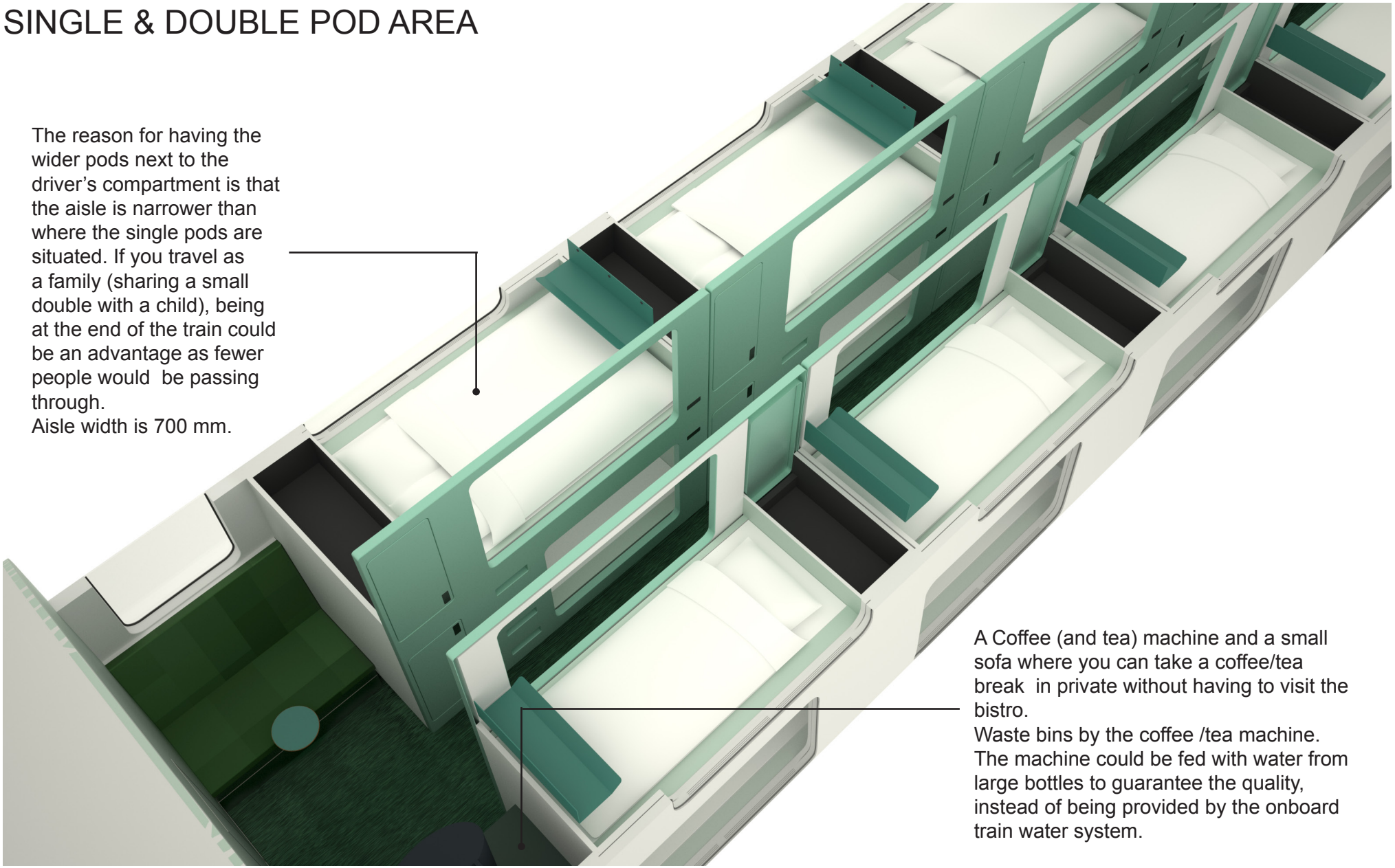
Car D is a sleeping area.
The blue colour setting is inspired by the sea
with its stillness and healing effect.



CAR:
Single beds: 8
Small doubles: 8

SINGLE & DOUBLE POD AREA

The reason for having the wider pods next to the driver's compartment is that the aisle is narrower than where the single pods are situated. If you travel as a family (sharing a small double with a child), being at the end of the train could be an advantage as fewer people would be passing through.
Aisle width is 700 mm.

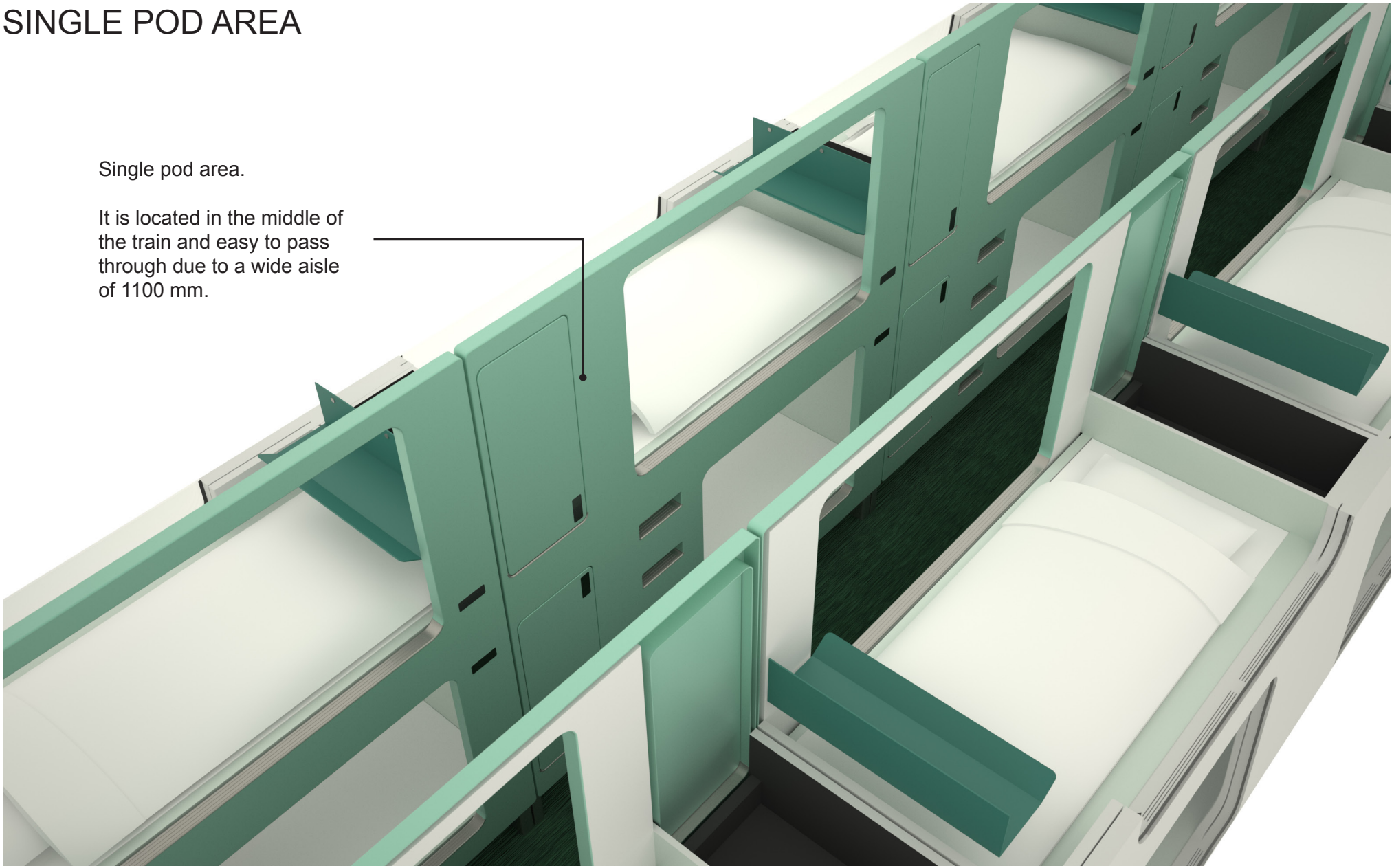


A Coffee (and tea) machine and a small sofa where you can take a coffee/tea break in private without having to visit the bistro.
Waste bins by the coffee /tea machine.
The machine could be fed with water from large bottles to guarantee the quality, instead of being provided by the onboard train water system.

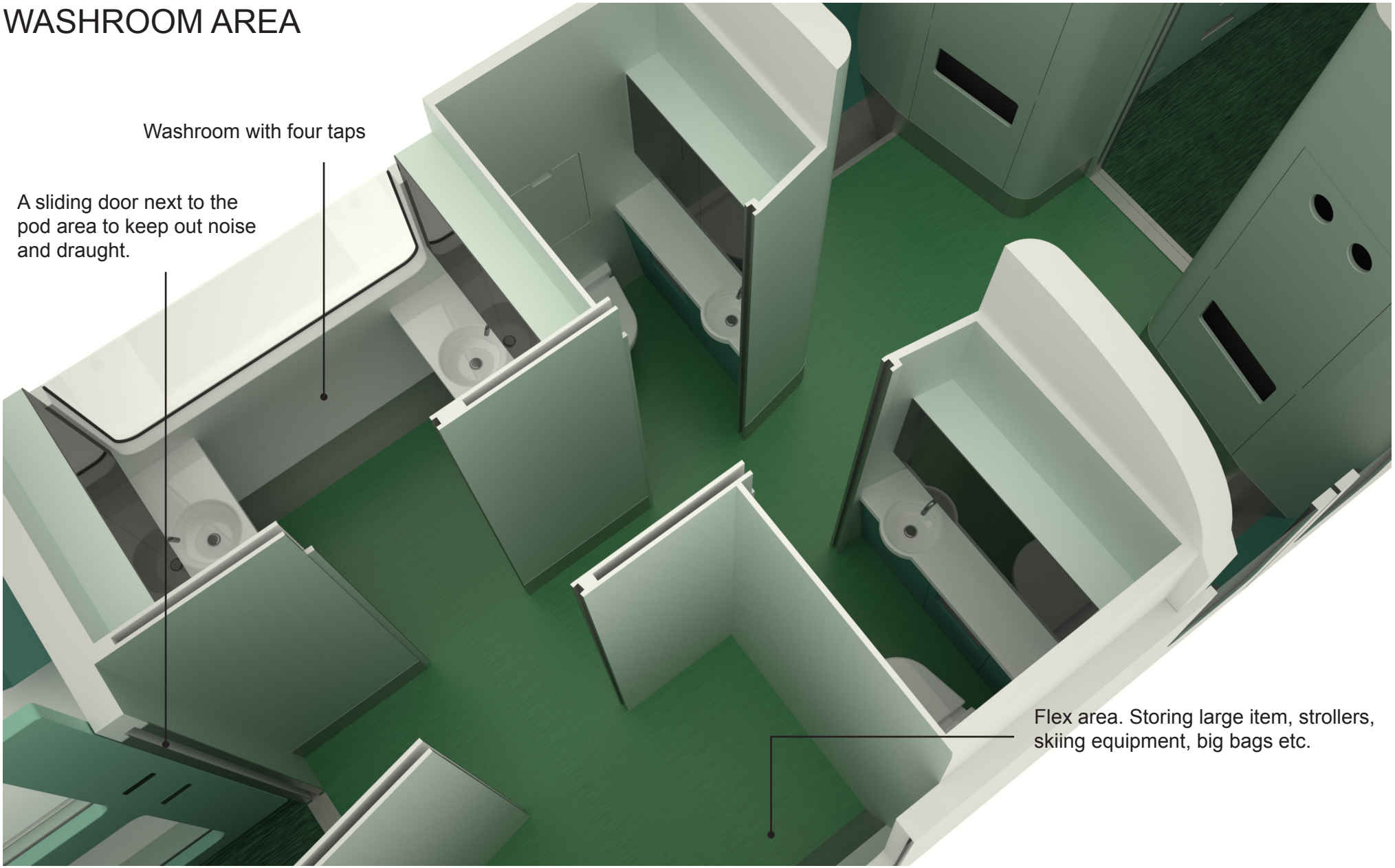
SINGLE POD AREA

Single pod area.

It is located in the middle of the train and easy to pass through due to a wide aisle of 1100 mm.



WASHROOM AREA



By keeping lavatories and washroom together as a cluster you use it more effective than if spread out over a larger area. No long queues to one lavatory while another is vacant.

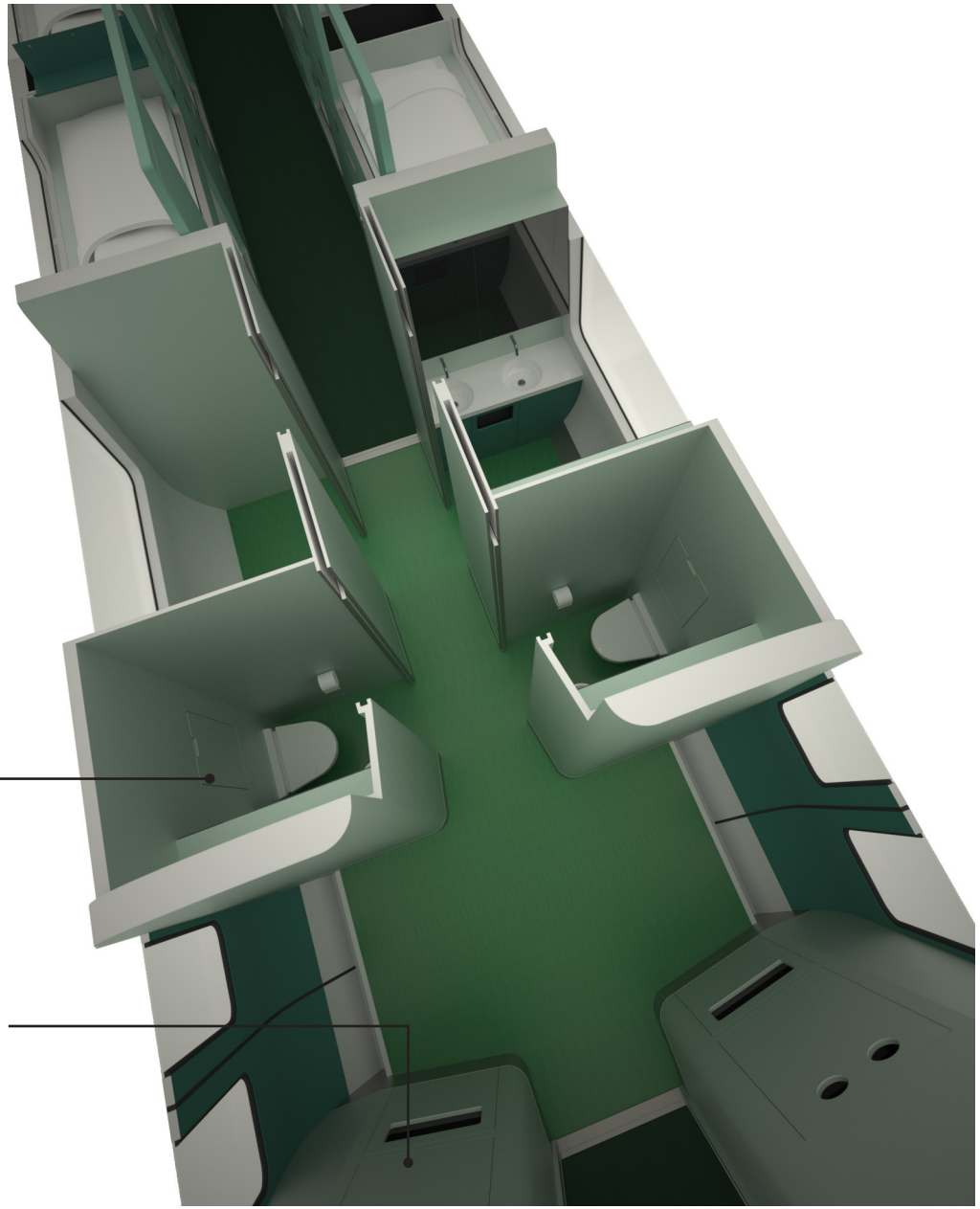
Lavatories and washrooms are located by the vestibule so you could wait there instead of near the pods where the space is tighter.

The number of lavatories is pretty generous compared to a normal train travelling during daytime.
It is because a night train have to consider peak hours, just before bedtime and in the morning.

The washroom/lavatory area is located in between two sleeping areas so it provides easy access from your bed.

The lavatories have baby change facilites.

The refuse area is located in the vestibule - dispose of your trash when you leave the train.



SOCIAL AREA

The high floor is separated from the low floor by a wall with a glass screen which helps with reducing noise and prevents it travelling the full length of the space.

High floor section of the social area: A sofa with chairs and small tables, suitable for two persons as well as a group of people.

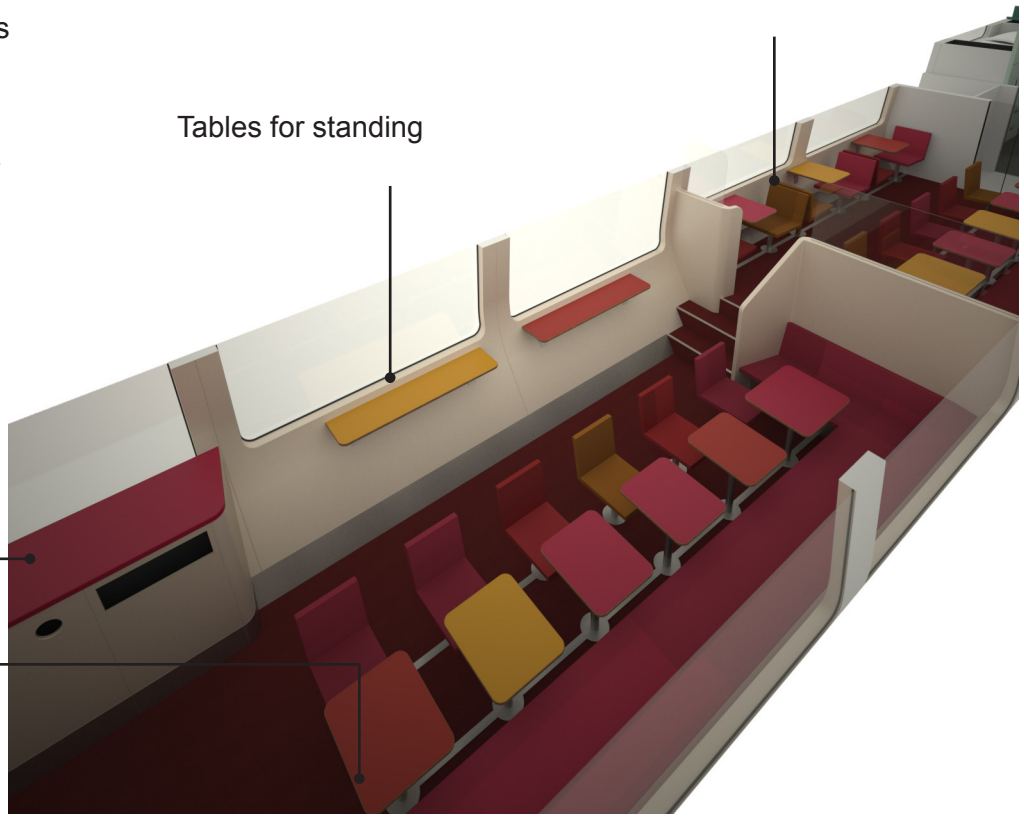
A door to the crew compartment.

The bistro unit consists of a part facing the traveller: a self-service fridge, a coffee machine and a pay point.

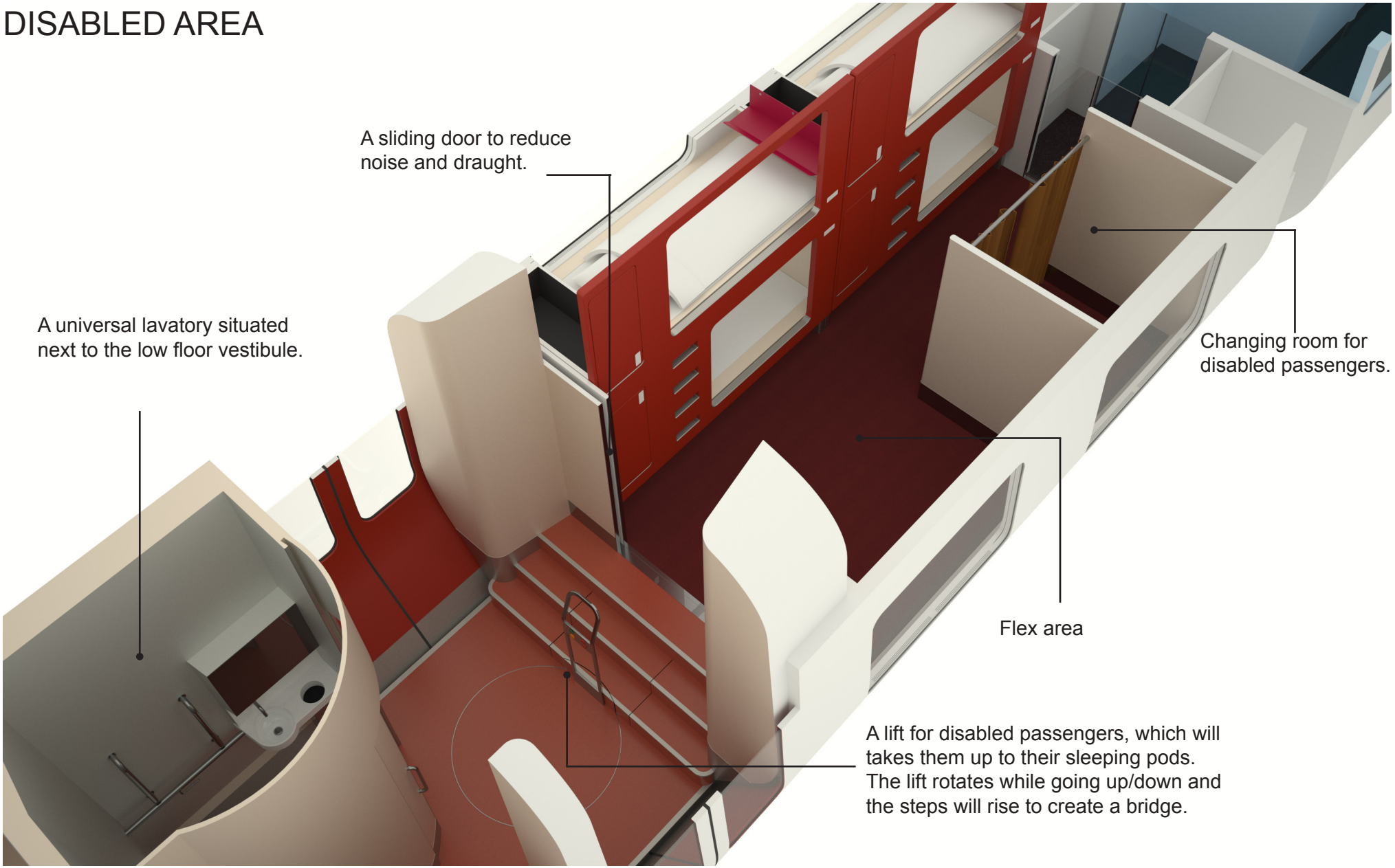
The crew access the bistro unit through a foldable desk top.

The social area is situated in between the compartment/area for disabled passengers and the area fitted with pods.

This is the only car with a low floor (to provide direct access from the platform for disabled passengers) and therefore has stairs in the aisle (due to the bogies) for access to the high floor area.

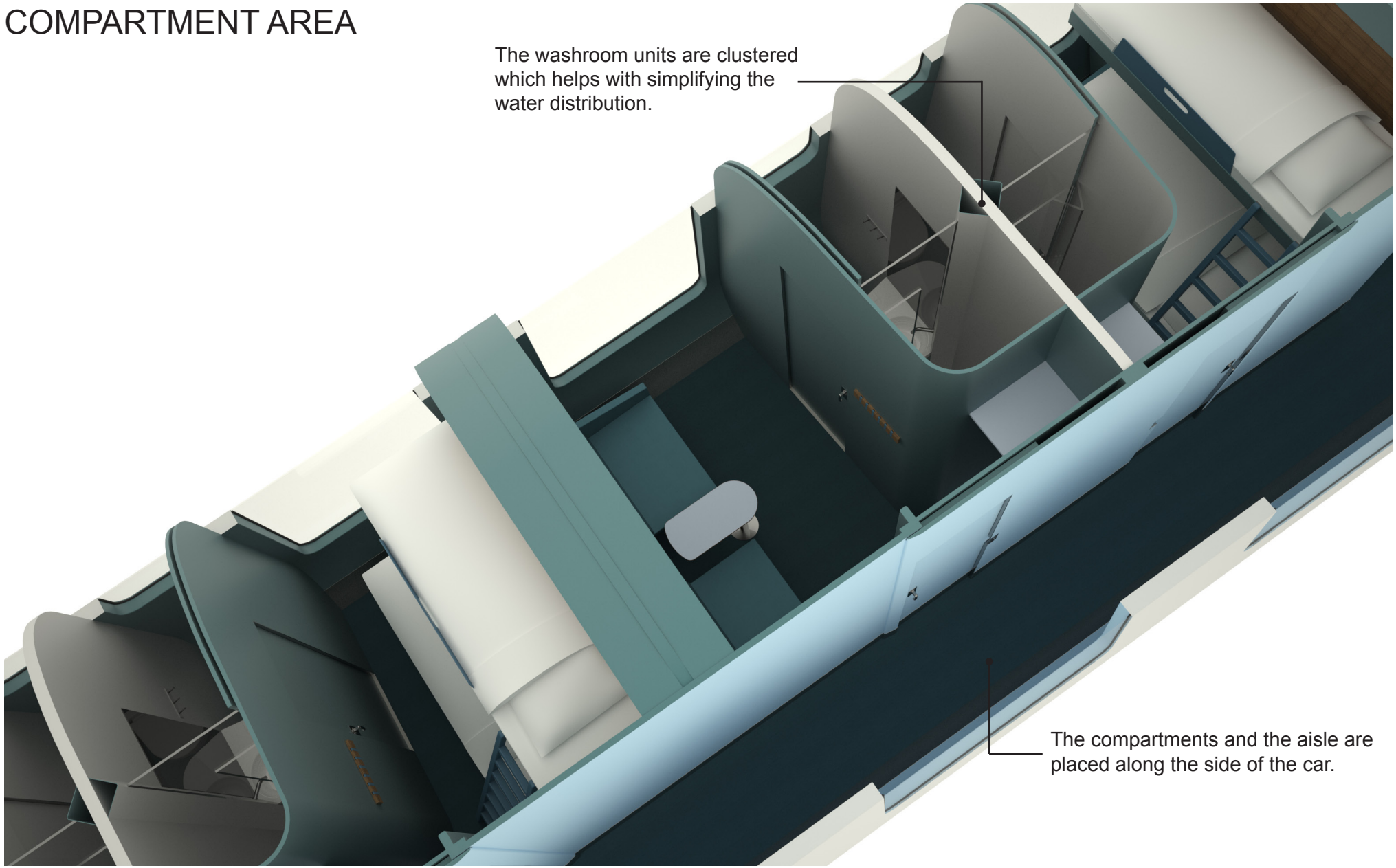


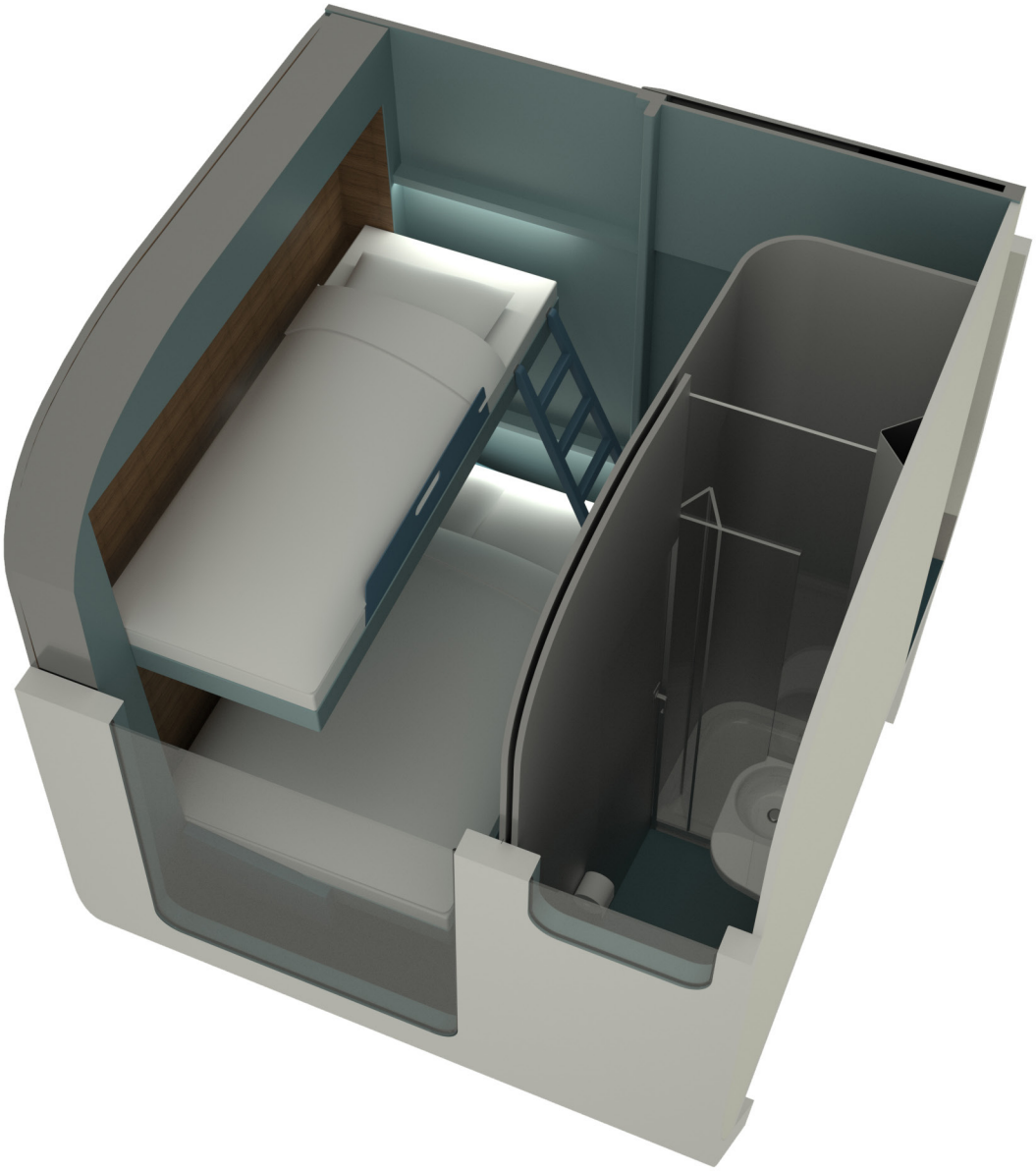
DISABLED AREA



The lower pods are aimed for the disabled passengers. If they travel with an assistant, then their pod is on the top.

COMPARTMENT AREA





DISCUSSION

There are many reasons as to why night trains have problems attracting customers, but air traffic is serious factor. The night trains currently in traffic are slow, the coaches are old and offer long travelling times, and due to an, in most cases, lack of comfort and service, it is difficult to attract new customers.

Taking into consideration future travelling times if/when the train tracks would be in a condition which would enable the route Stockholm - Kiruna (Narvik) to take 10-11 hours, would that, in combination with my concept, be enough to provide a financially sound night train connection? Would it work at all, only seasonal or the year around? If there would only be passenger demand for a part of the year, on which route would the train run the rest of the year? It would not be a sound business unless it was in traffic the whole year around.
Would it be possible to find an operator willing to invest in this route by proiding new trains? Is it possible to agree on a range of train fares which both the traveller and the operator would find reasonable in price?

The Göteborg via Stockholm - Åre is a route which would have the highest potential as it already carry a lot of passengers, and a better standard would attract even more. There is less competition from air travel due to the closest airport is situated in Östersund which is more than an hour's land travel away from Åre.
During low season a three car train could travel from Göteborg to Åre, collecting more passengers in Stockholm, while during high season five car trains could run from both Göteborg and Stockholm. On peak days you could even run an additonal train.

How near the true figure is my estimate regarding the number of pods vs compartment, in my proposal? How popular would the small doubles be?
It is difficult to anticipate a passenger's reaction to the pods. Will they find them cozy and luxurios, therefore creating a lower demand for compartments? Or will they find them a too strange way of travelling?

Would people like the idea of a better quality private bed and no assigned seating instead of the solution we have today?
Is the social area of the train large enough? Will it work having more cars connected to the set?

This is a night train which will be in service every night. Would this be enough or should the train also be in use during the day, and in that case with just the social area open? And if so, which routes would the train be used on? Sightseeing routes i the north of Sweden for a few hours during the day, would that be a solution? Probably not.

To reverse the current trend, something new must happen to night trains but which operator would be willing to take the risk of investing in something which is facing has such a negative trend?
Are there lines that can carry such an investment? Could we place our hope with the route I previously mentioned, Göteborg, via Stockholm - Åre.
An overnight train runs once a day while a fast train between Stockholm and Göteborg can run four times a day and can also take considerably more passengers.

Will the existing ones be refurbished a few times more before the era of night trains will be over?

Is there any chance at all for new night trains in Sweden?

CONCLUSION

By not insisting on including assigned seats for the few hours spent awake on a night train, opportunities were created for new solutions which are better at meeting passengers wishes and desires.

If you do not want to spend the time in your pod, the new seating option is now in the bistro/social area. It will provide you with the opportunity to sit alone, or in company with others, spending time during the hours before bed time. You can enjoy the journey by watching Sweden's beautiful landscape. through the generous sized windows.

You can also enjoy the surrounding landscape from your pre-booked bed. The pod, the replacement for the couchette, has panoramic windows which will make you almost feel at one with nature. The soundproof pod fitted with a high quality mattress will have little in common with the traditional couchette. The journey will be more enjoyable as you will have the option of controlling the temperature with the use of a thermostat and you can choose between a standard sized and a wide bed. Having the option to choose a wider bed makes it possible to share a pod with your partner as well as with your children, without disturbing or getting disturbed by other passengers Travelling in a pod, would for a child probably feel like an adventure.
The pod with its features is, as far as I know, something totally new and unique for the train industri.

The compartment, which is a revamp of the traditional fully-equipped sleeping car, is providing a pleasant journey for one person or for anyone wanting to have a room to their own. If you book a compartment it will guarantee a private space you do not have to share with other passengers. You will also have the convenience of your own shower and bathroom and to be able to take your time getting changed in your own environment. High quality beds with thick mattresses add to the comfort. You also have the choice between sleeping in standard sized bed or a wider one, both would be available in your compartment. The compartment have room for 2-3 people. During the waking hours you can sit in one of the chairs and enjoy the view through the large panoramic window covering almost the entire wall.

The concept provide new opportunities to reverse the trend of decreasing night train traffic and a way to take a fresh approach to train travel.

Finally, do the wider car body provide new opportunities for a night train concept?
It will depend on the shape of the car body. The beds in the compartment are placed in the same direction as in the traditional sleepers/couchettes. So no, in comparison to the old coaches it would not make a crucial difference.
With regard to the pods, the small double, would not be possible to fit into a continental car body if you also place a single pod across the aisle.
The aisle is simply too narrow.
Single pods on either side of the aisle is feasible in a narrower car body.

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INTERVIEWS

Interview 1

(ÅT) Female, 35-40 years old, mother of two.

If you have a large suitcase or bag then there is the issue of finding a space for it, where to leave it. She would consider leaving the bag out of sight.

She prefers the bottom bunk in a traditional couchette. The main reason for this is that it is quiet and dark and it is possible to read / keeping the light on, without disturbing anyone else.

She prefers to embark a while before it is time to go to bed which will leave time to lounge/read before going to bed/arrange for bedtime. 9 PM is about right. Likes watching a film before going to sleep. As a mother of small children she considers the trip as personal time for contemplation and time to read and relax.

She likes a bistro, but is not always visiting it when travelling for leisure.

A lavatory is preferable, but does not think that a shower is necessary when travelling for leisure.

When travelling for work she prefers a shower room and for the space to not be too cramped so that it is difficult to change or get dressed, and she will not accept a communal shower in the corridor. Thinks it is nice with a shower in the morning if she has not having slept very well.

Most important when travelling for leisure:
- Suitable train times
- Reasonable train fares
- Not having to change trains or arriving at night time.
- Clean and fresh good quality bed linen.

Travelling with children:
- Slightly wider bed/bunk (to make it possible for a child to sleep be side)
- For the bed/bunk to have a proper safety edge
- A shared couchette is fine, but can cause you to worry that the child will bother other passengers. The reason for a couchette shared with other passengers is that it is more economical.

What can be disruptive:
- Temperature, too hot/cold.
- Noise /snoring/coughing/sick passengers

She likes to wear leggings and a sweater to sleep as it makes it easier to get up/visit the lavatory.

Would appreciate to have more privacy when travelling than a couchette can offer and for it to be sound and light proof with the option of controlling the temperature.

When travelling by train she likes timetables, which takes possible further transfers by buses and trains, and also opening hours at the end destination, into consideration.

She considers a night train an easy and smooth way of getting from A to B.

Interview 2

(LB) Female/35-40 years old /mother of two (she has travelled by train in Sweden and Norway)

She likes to arrive early ahead of departure and will go directly to her carriage to prepare her bunk if it is set in the bunk position.
Any large bag she will store under the table by the window and will leave other bags in front of the upper bunk above the door. The shoes will go under the bottom bunk. She does not mind leaving her bags unattended in the carriage and she keeps her valuables in a bag she carries with her. For short errands, like visiting the bathroom, she leaves her valuables on the top bunk.

The reason she prefers to book a top bunk is:
Does not feel as exposed
It provides extra headroom with a shelf for storage.
She can reach the thermostat and will adjust if the temperature if it is too hot

The lower bunk is her second alternative. The advantage is that it is cooler.

She avoids the middle bunk. She finds that bunk less comfortable.

Neither does she like the net pockets placed at the centre of the wall by the bottom and middle bunks. If used to store your items it can impose too much on the width of the bed space and you also end up displaying your items in front of other passengers.

She likes to spend time in her bunk once it is set up for the night.
- She will wear something similar to what she usually wears, making sure it is comfortable to wear for travelling, possibly a sweater and leggings and can remove layers if needed. She will do this while in her bunk.
- As she sleeps better if not hungry, she likes to eat something light and will do so before bedtime while in her bunk.

After getting ready for the night in the bathroom
- Sets her alarm, put in ear plugs and possibly read for a while.
- Closes the curtains and switches off the light in the carriage.

The protective device on the top and middle bunk is slightly obstructive when getting down and back up again, but she feels the ladder is easy to use.

In the morning:
She gets up late, close to arrival time, and does not feel anxious that the lavatories will be occupied (as that is rarely the case)

In general she does not view travelling by night train as a pleasure, only as a means to travel from A to B. There is noise from the train itself, people snoring and music escaping from head phones.
Despite this she does not look at a sleeping car as an alternative as the cost of travelling for in her free time is an issue. She would rather accept a night with disturbed sleep at a lower price when not travelling for work.
Breakfast: She will bring a thermos and a sandwich. She is not too bothered by breakfast and prefers to spend her money on lunch or dinner.

She would not consider travelling with children until they are at least 5-7 years old. Before then she feels she would not be comfortable to know that they would not disturb the other passengers. This is with regards to all of them travelling by couchette, as a private sleeping car would not be considered due to cost.

For business:
- Own sleeping car
- Good sleep comfort
- Breakfast on the train. To have the option (at point of booking) to be

able to choose between a breakfast bag or to sit in a restaurant car to eat a breakfast served onboard. She prefers to not breakfast in her sleeping car as after a night's sleep in the space she does not consider the air to be nice and fresh, so prefer to eat in the restaurant car or on the go.

- A lavatory inside the sleeping car is not necessary, but would like access to a larger sized lavatory with space to change and get ready.
- No need for a shower and would not use it even if it was available.

She does not consider the trip as a form of social event but will take circumstances and travelling companion/s into consideration. It is mainly a way to combine travelling and sleeping.

Prefers to arrive around 7-8 AM with departure at 10 PM and would rather depart earlier than arrive late.

She does not like the hassle of putting on shoes to visit the lavatory, that shoes are needed due to dirty floors.

The sleeping cars currently in use she considers too cramped, that you feel trapped and with a too small door. Would rather that the space felt more as being a part of the corridor outside and likes to sit and look out through the window, but the window is small, and, as she remembers, placed high up in relation to the seating inside a sleeping car.

She would like fresh, ventilated air and a comfortable bed.

Interview 3

(DO) Male/35-40 years old /father of two (he has travelled night train in Sweden and Switzerland)

He always asks the conductor about the bookings in the couchette he has been booked to travel in and if there is one which is empty as he prefers to sleep alone. Despite this he chooses a couchette (with six bunk beds) as it is less expensive.

He travels almost always with skiing equipment and sometimes with a bicycle, which he wants to bring into the couchette. Due to the risk of theft he does not want to leave these items in the designated storage area of the train. The skis, etc, is stored under the bunk and as he himself is not very tall he usually store his bag at the foot end inside the bunk. The net shelf on the wall by the bunk will be used for storage.

He feels no need to socialise on the train and wants to be in charge of his time and go to bed straight away if he feels like it. Does not like having to take other passengers into consideration and lack a private space. It is a problem when travelling with a night train which departs earlier than most people would consider bedtime. A desirable departure time is 10pm as it considered an acceptable time to prepare the bunk and go to bed.

He sleeps in his underwear, the same as he does at home, and will change for the night while inside the bunk. It is cramped, a bit too cramped, and he would prefer more headroom.

He sleeps well and prefers the bottom bunk as it is easy to get in and out, with no need to climb. The middle bunk is his least favourite.

Finds it OK to have the lavatory in the corridor and would not pay extra for one inside, would much prefer to instead share the couchette with fewer passengers.

If he is travelling with his family (two adults and two children) they book a 3-bed sleeping car, even though he considers it to be a bit too expensive. It is an advantage to have your own lavatory when travelling with children and if he were to travel himself with two small children he would almost consider it a requirement.
When they only had one child (and were financially less well off), they chose a couchette.

The net safety device is useful when you share with a child and you can yourself lie against it and this way there is space for a child. This is not available on the lower bunk which he thinks is a shame.

When travelling for work he wants a sleeping car and likes to be able to have a shower and is happy with a simple breakfast to go or eat inside the sleeping car, not sitting in a restaurant car.

In general he considers a night train to be time well spent, a good use of time if you are going away for a few days.

He thinks it feels secure to travel by night train and considers sleeping couches travelling by road as a less safe alternative.

Interview 4

(PD) Female/35-40 years old /mother of two (she has travelled by train in Sweden and Thailand)

She considers 7pm to be a suitable departure time for a night train and will go straight to her place to mark her territory. To be able to keep an eye on her bag she wants to keep it with her in the same space she is staying.

The preference is for the top bunk, and her second choice is the lower bunk. She will then gather her valuables and go to the restaurant car where she will try to make the trip pleasurable by treating herself and reading a magazine or a book.

Likes to take it easy and wind down by eating and reading as she is often stressing making it to the train.

She will not be socialising if she is travelling alone, instead preferring to have time to herself and read, watch a film, read.

Does not want to go to bed straight away and can get annoyed when everyone/someone else in the couchette wants to go to bed straight away as there will the not be any space left to sit.

If she were to travel with children she wants her own sleeping car, preferably with a lavatory.
She really likes for there to be WiFi so that she can see a film on her tablet, and to go for a walk on the train.
Does prefer to share a bed with the child, but if not, the child should sleep in the lower bed in case the child should fall out of bed at night.

What she finds annoying:
Snoring and other noise from other passengers (couchette)
Temperature (too hot/stuffy etc)

Potential breakfast she wants to receive in a bag and eat in her sleeping car /couchette and not having to visit the restaurant car in case there are no free seating or difficulty finding it if the train has many carriages.

She would like an access to a coffee machine so that there is no need to visit the restaurant car. She likes looking out at the landscape and appreciates an adjustable seat in the corridor, with a table if possible.

If she were to travel for business she would not like to share sleeping space with colleagues and would also like to have access to a shower and being able to hang clothing.

Interview 5

(EE) Female/60-75 years old / (she has travelled by nigh train in Sweden)

She travels by couchette as she does not think a sleeping car is worth the extra cost and does not mind which bunk to sleep in.

Thinks it feels safe to keep the bags inside the couchette car and takes her valuables with her if she leaves.

She sleeps well, no problems.

Once she shared a mixed couchette with a male stranger and found that a bit uncomfortable.

She thinks that night trains are a good way to travel, to travel and sleep simultaneously. What can be an issue (living in between main destinations) is that departure and arrival times can be at near night time and if there are train delays then it can be tiresome.

To have the lavatory in the corridor works well and she does not care for a shower.

If she were to eat a breakfast she would like to do it sitting in the restaurant car and not eat it sitting in the couchette where she has spent the night.

Interview 6

(KS) Female/60-75 years old / (she has travelled by night train in Sweden)

She has mainly travelled by couchette care for financial reasons and she has found it acceptable.
If she were to travel by night train at this point in time she would like a sleeping car and a private lavatory would be important. A shower feels like an unnecessary luxury.

She wants to sleep in the top bed/bunk as the other ones make her feel claustrophobic.

Sounds from other passengers can be disturbing during the night.

She has usually departed early (around 7pm).

After she has brought her luggage to the couchette – she wants her luggage by her bunk which usually makes the space cramped when carrying skis and equipment – she then wants to visit the restaurant car for something to eat and to look at the landscape and chat to other passengers and will return to the couchette when it is time to sleep.
She does not worry about her bags she keeps in the couchette and carry her valuables on her.

If she is going to have breakfast on the train the she wants to sit in the restaurant car. To eat breakfast in the restaurant car while looking out on the landscape is to her the highlight of the trip.

What she likes the least is to turn prepare the bunks for the night as she thinks this can be difficult.

As she is short and her bag sometimes is heavy she thinks it is difficult to place her bag on the luggage rack What she thinks is lacking is a safe storage space of skiing equipment and luggage when travelling during busy holiday times when most passengers carry a lot of luggage.

Interview 7

(IN) Female/60-70 years old / (she has travelled by night train in Sweden)

She will choose a sleeping car if travelling with a companion as it feels less cramped.

If she is travelling by couchette she will choose a single sex couchette car, and she prefers the lower bunk. The top bunk is too high up and she finds it difficult to climb up.

She remembers the bunks as being hard and has difficulty sleeping regardless of what type of car she is travelling in as it is the sounds of the carriage and the other passengers which are disturbing her.

When travelling in a couchette car she sleeps in her day clothes.

Where she will decide to place her luggage depends on the size and weight of her bag. She prefers to place it at the top if possible but can otherwise keep it by her feet inside the bunk as it is long enough.

If the train departs before bedtime she will go and sit in the restaurant car.

When the bunk is set for the night she will sleep, read in the bunk (the lights are well positioned so do not bother other passengers), or sit in the corridor.

The worst experiences w hen travelling by train are things like crazy, drunk or unpleasant passengers, or if the temperature is too hot or too cold, or bad ventilation.
The best situation, she thinks, is if she can manage to fall asleep during her trip.

She feels that the luggage is safe inside the couchette and takes her valuables with her in a small bag when she leaves.

Would go to the breakfast car to have breakfast but often brings her own.