Internship Project-DC Design

Design of a Mobile Hospital unit on a existing vehicle platform

Project Title : Hospital On Wheels
Submitted By : Amey G Dhuri

Duration :- 5th May to 5th June 2008

Project Guide :- Mr. Dilip chhabria
Mr. George Thomas

Company Overview :

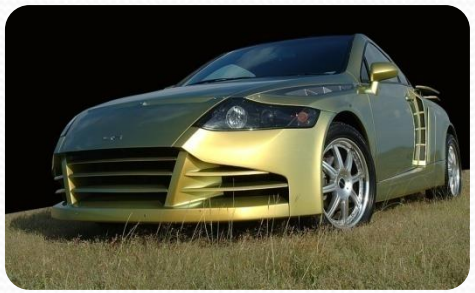
Dilip chhabria design was founded in the year 1993 with the sole aim of offering Design and prototyping services to Indian OEM industry as well as customized one off solutions to individual buyers.

15 years down the line the company has to its credit over 550 designs on the roads in these segments. In the process company has built a very strong brand ‘DC Design’.

The company has proven its capabilities globally having executed projects for GM, NISSAN, ASTON MARTIN, TOYOTA, FIAT etc.





Project Details :

Project Brief : To Design a Mobile Hospital unit on a existing vehicle platform

Project Title : Hospital on wheels

Project Purpose : This vehicle will be a mobile hospital which will be built on a large bus platform it will be used for health check up camps in corporate as well as rural areas. This vehicle will be having facilities such as operation theatre, a x-ray room, Dental care, pathology lab, Toilet area etc.

Project Deliverables : 1)Find out client requirements and finalize the Platform for the project.
2)Prepare concepts for Layout of vehicle.
3)Finalize the concept and validate dimensions of the equipments.
4)Prepare a 3D model for the final layout showing volume occupation.
5)working of the concept idea.
6)Interior styling-Sketches.
7)exterior styling of the vehicle-Sketches.

Understanding clients requirements :

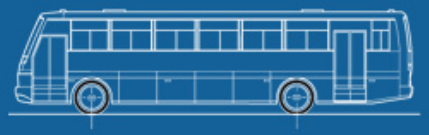
The client is a Doctor and he wanted a Vehicle which could be used as a mobile hospital The requirements are.

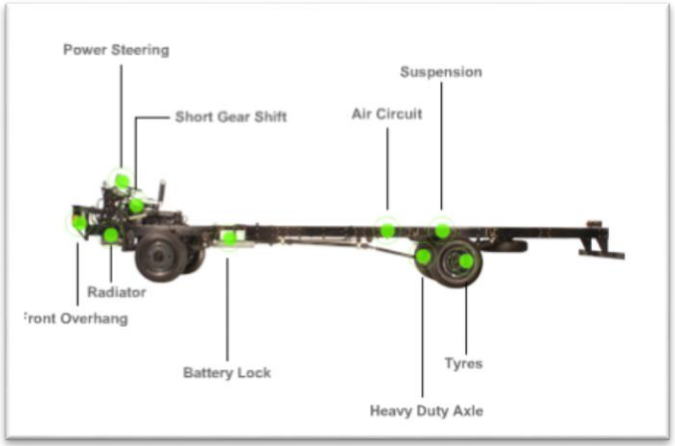
- Lounge area for the visitors
- Table and chair for a receptionist
- A doctors table
- Check up bed
- Dental chair
- Operation theatre bed
- Toilet & wash basin area
- Pantry area
- Storage areas
- X-ray room.

Benchmarking ,Research :

Platform : TATA Starbus 67

Table below shows the Technical Specifications of the Platform on which the Clinic is going to be built.

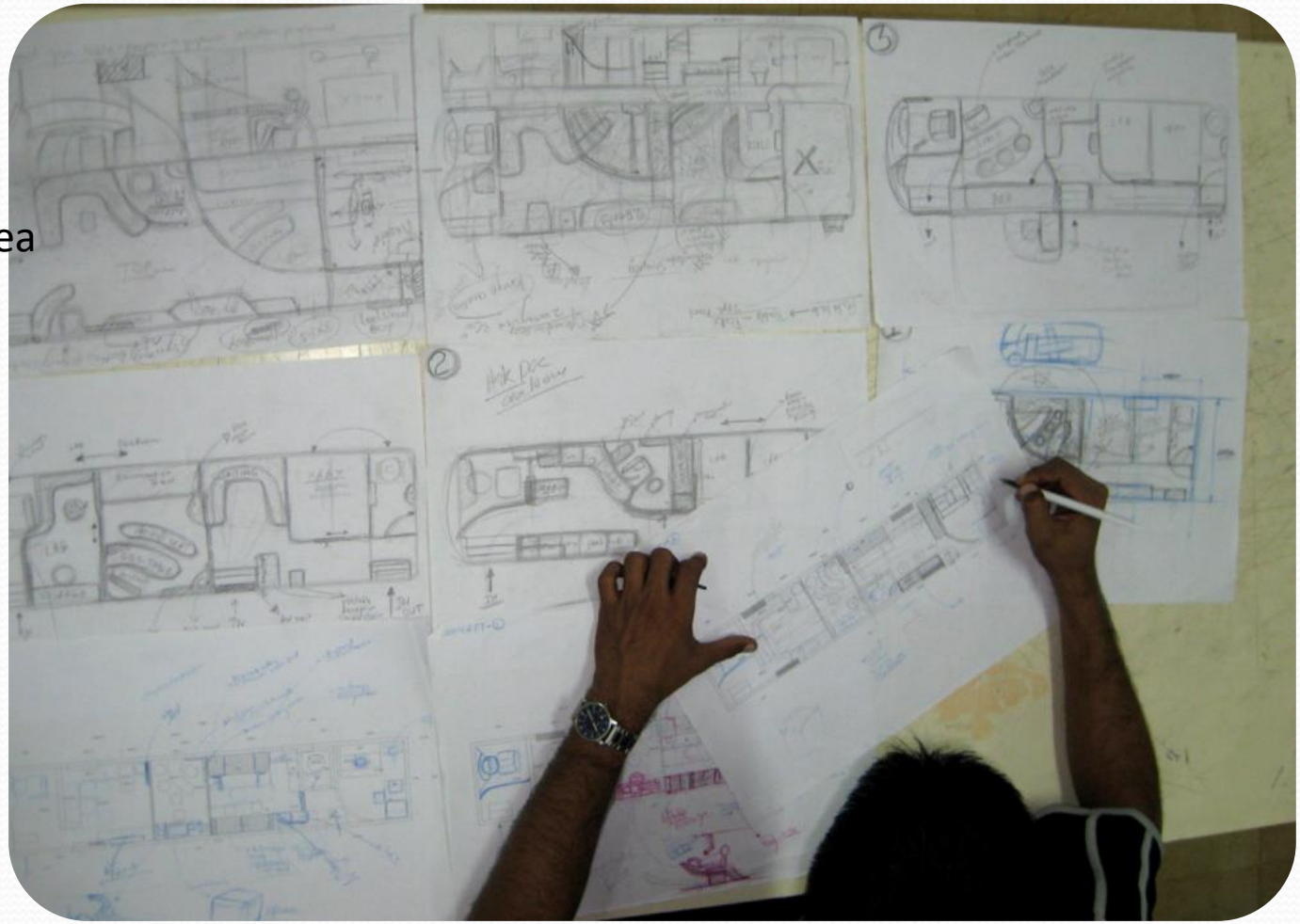
Starbus 67	
 Side View	 Seating Layout
Door Type	Double door
Chassis Platform	LPO 1610/62
Engine Power (Kw)	74 Kw @ 2500 RPM
Engine Torque (Nm)	415 Nm @ 1100 - 1300 RPM
Clutch Diameter (mm)	352
Gear Box Type	G600
Rear Axle Ratio	41/7
Steering	Power
No. of Tyre Size	6 +1
Tyre Size	10 X 20, 16 PR
Fuel Tank Capacity (litres)	250
Gross Vehicle Weight (kg)	16200
Basic Dimensions (mm)	Wheel Base - 6200 Front Over Hang - 2320 Rear Over Hang - 3430 Overall Length - 11950 Width - 2600
Seat Pitch	686
Gangway	430
Internal height	2150
Overall height (in laden condition)	3250



Layout concepts :

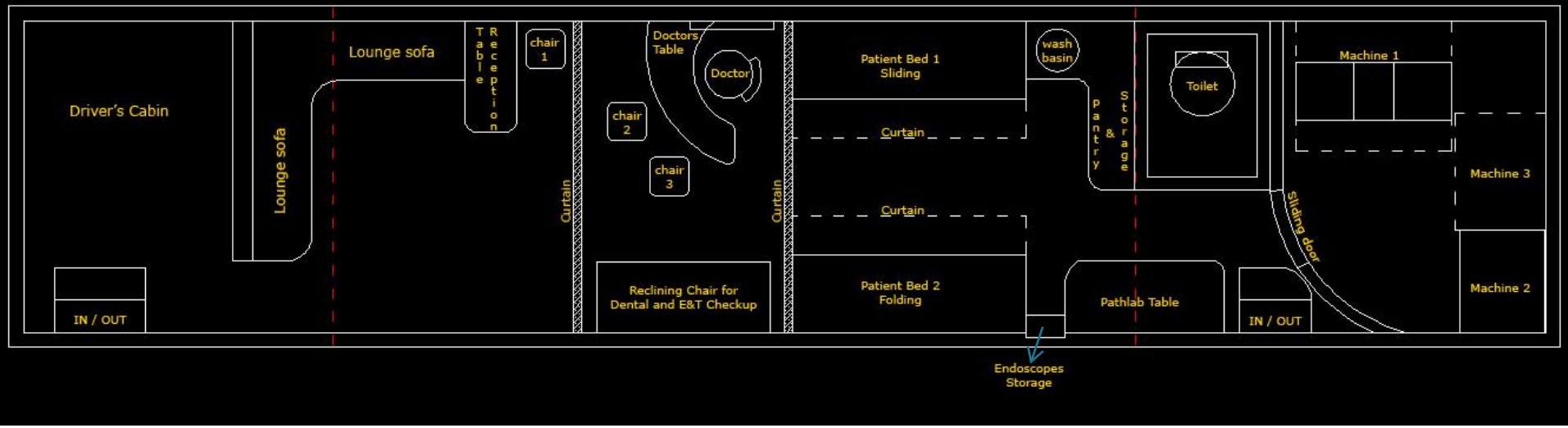
Areas to be included

- Lounge area for the visitors
- Table and chair for a receptionist
- A doctors table
- Check up bed
- Dental chair
- Operation theatre bed
- Toilet & wash basin area
- Pantry area
- Storage areas
- X-ray room.



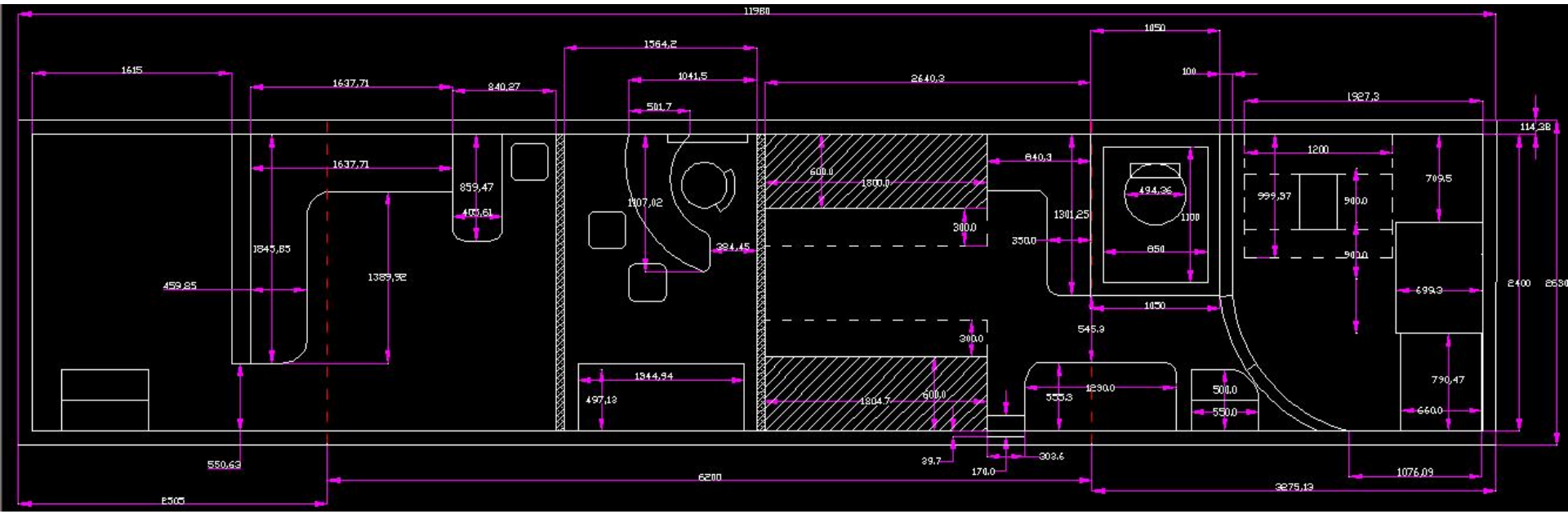
Final Layout Description :

Below is the final layout showing various areas of requirement within the vehicle.

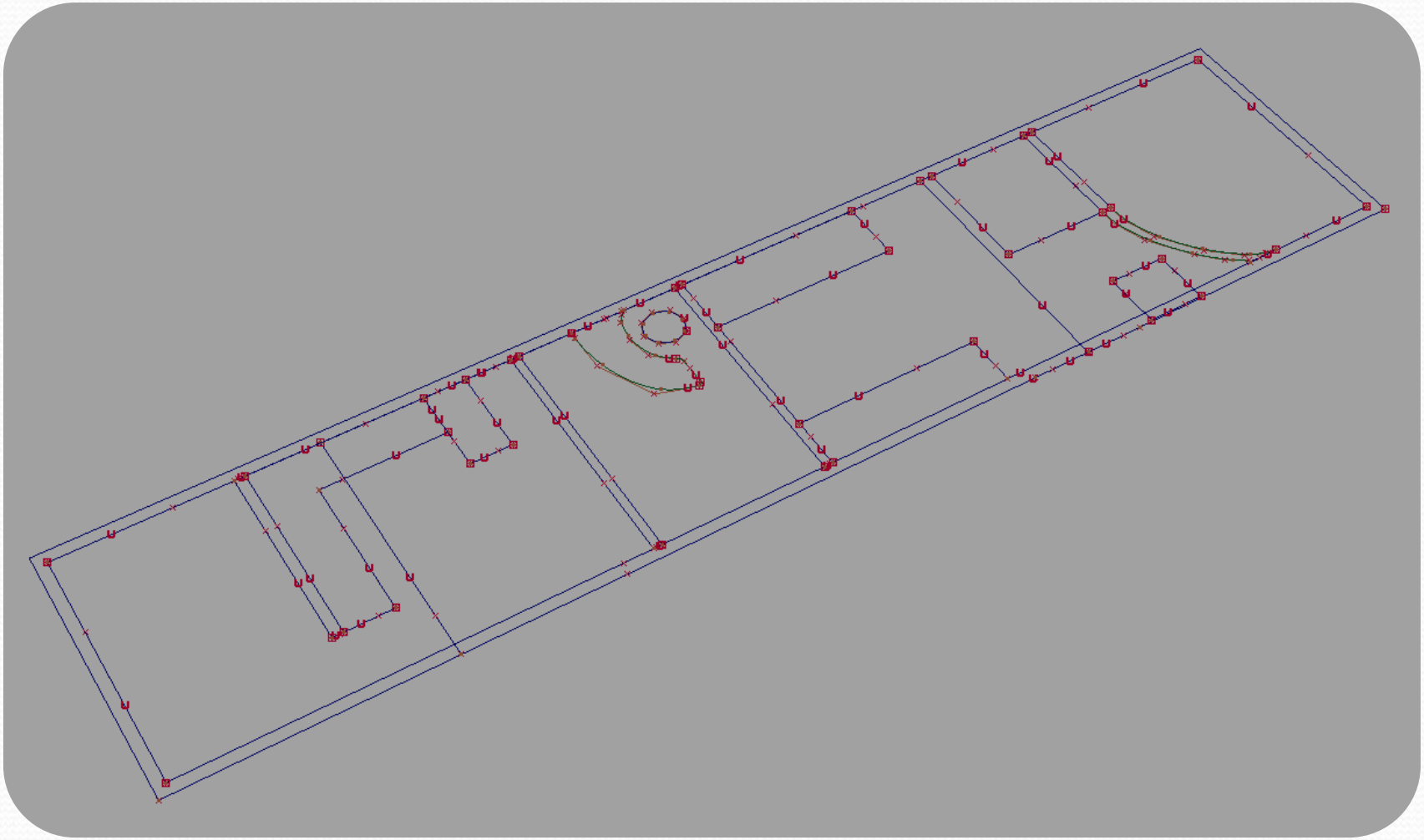


Final Layout Packaging / Dimensions :

Drawing below shows the dimensions given to each area.

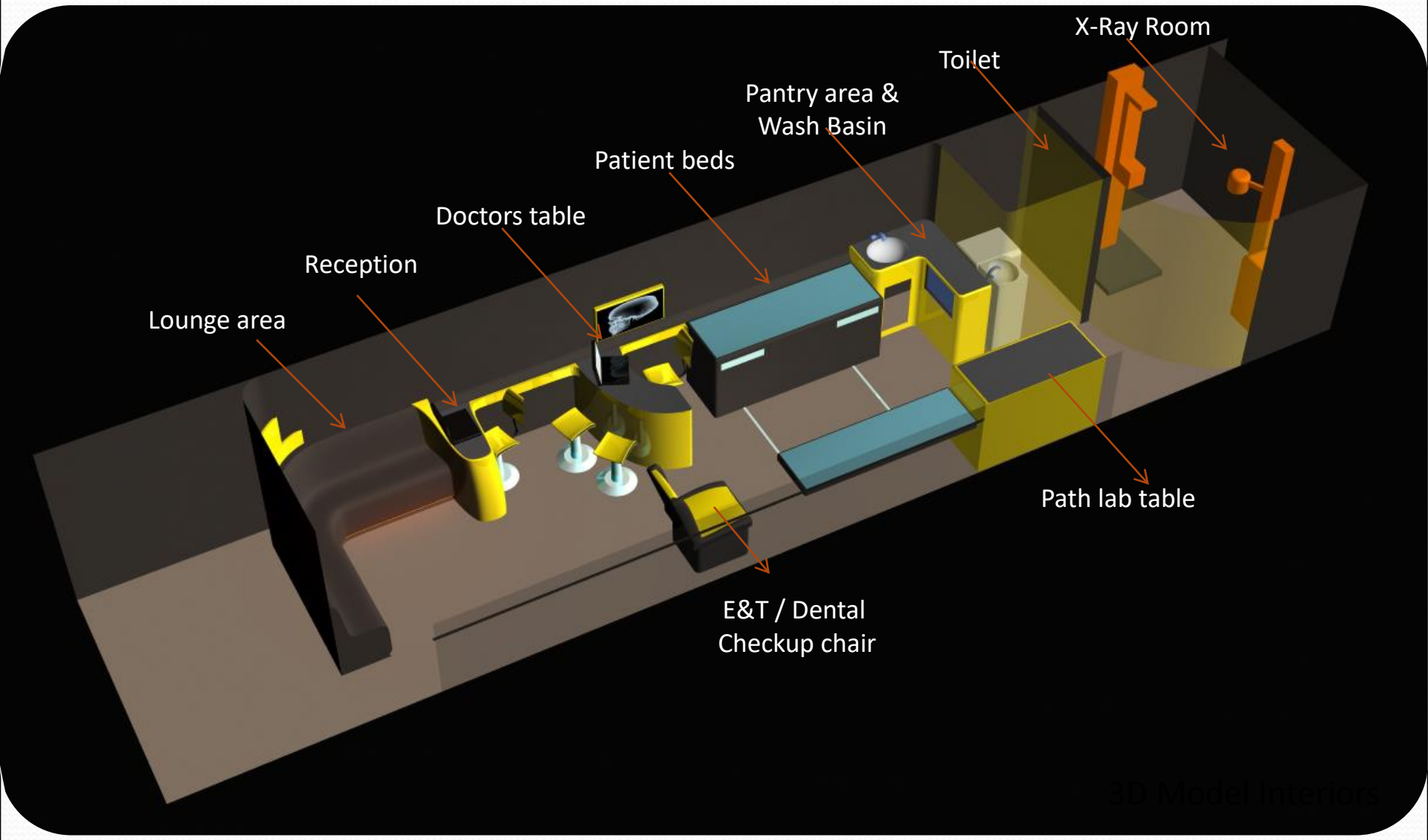


2D layout : Start of 3D Modeling

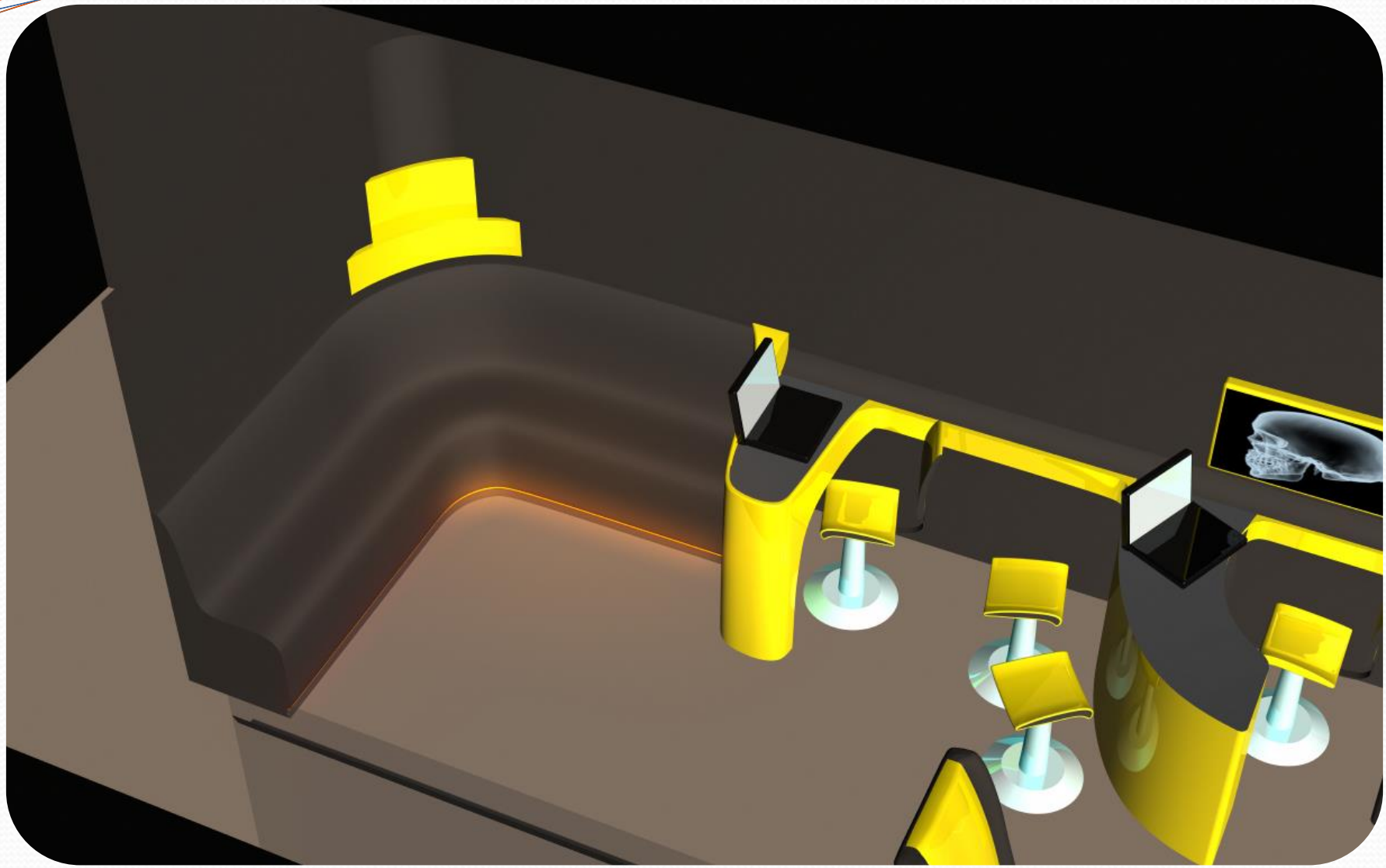


To start the 3D modeling a grid was formed which formed the boundaries for the interior elements.

2D layout to 3D model.

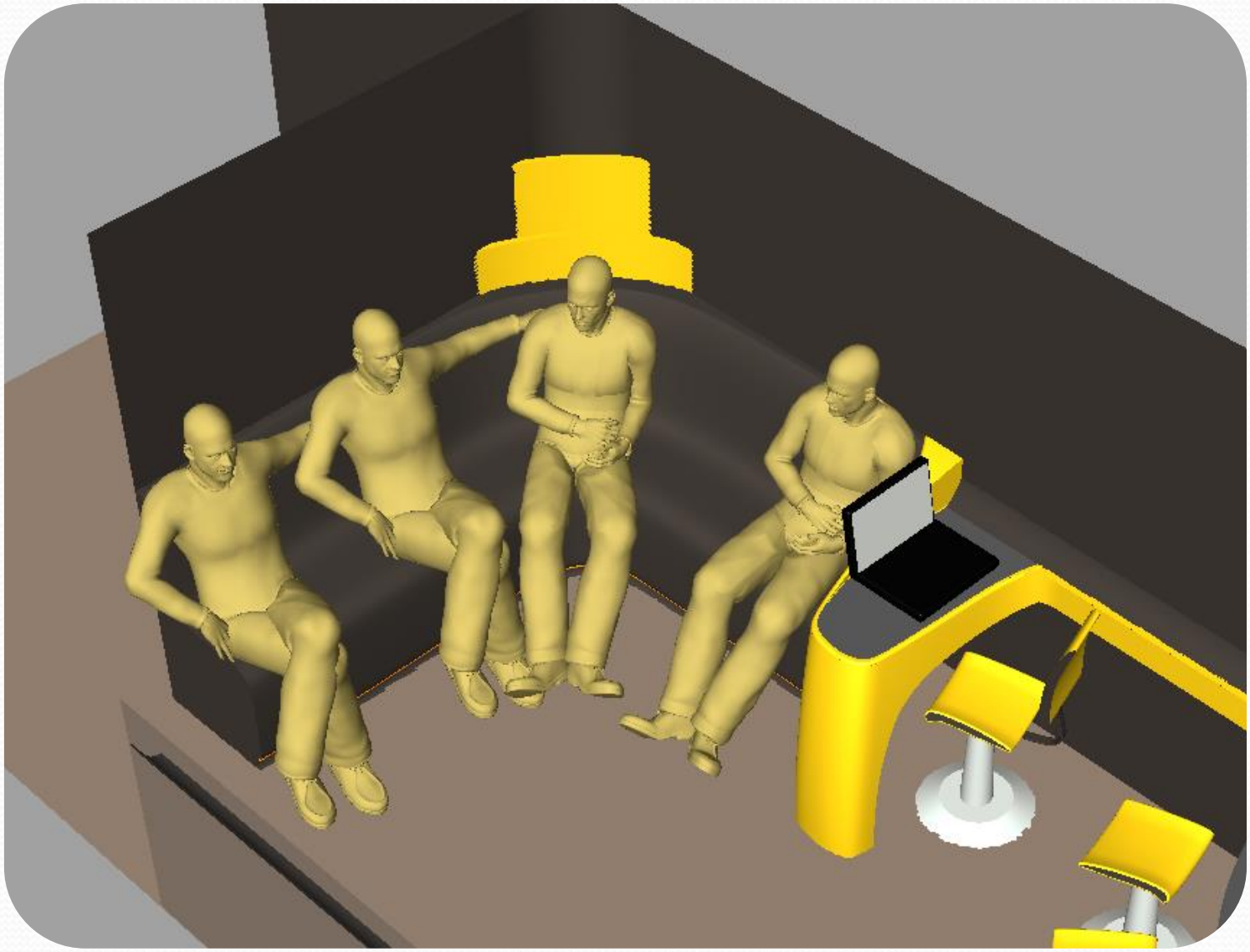


Lounge area :



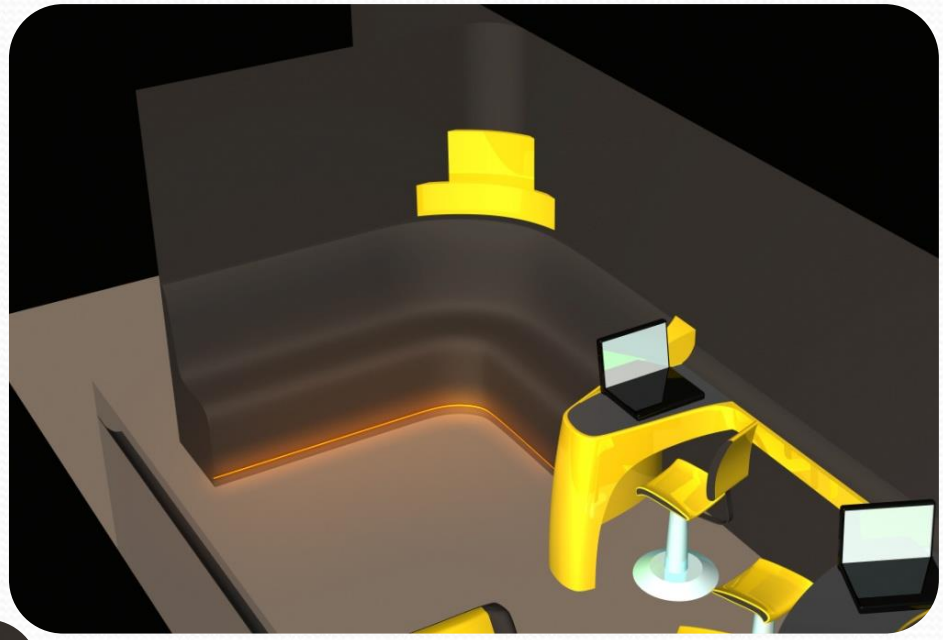
This is the lounge area it has a “L” shaped sofa in the corner which is connected to a small reception table. The size of the reception table is comfortable enough to hold a laptop on top of it and still provide some working space on either sides.

Lounge area seating space:



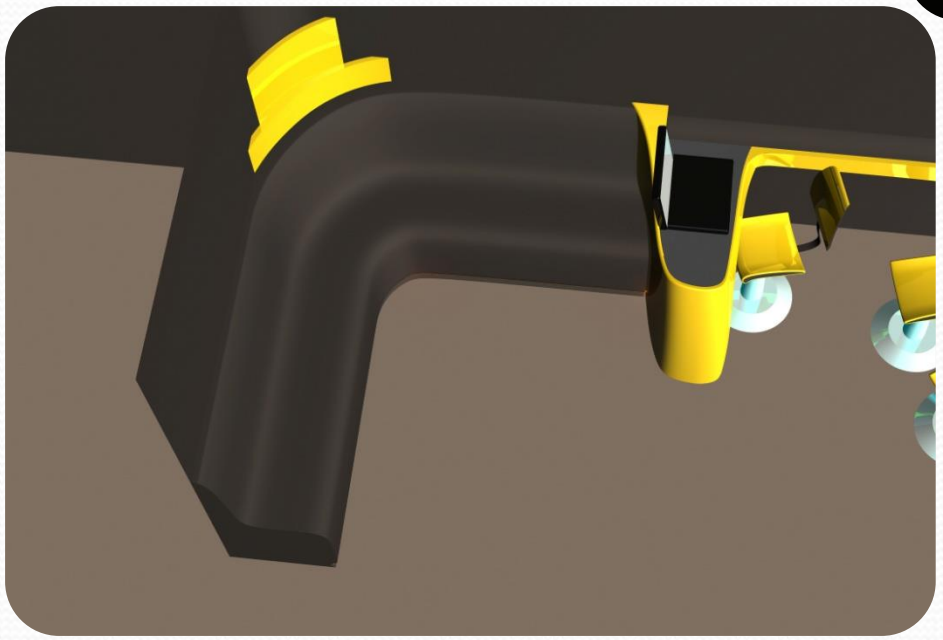
The sofa can accommodate 4 people comfortably with a lot of space still left around each of them.

Lounge area :

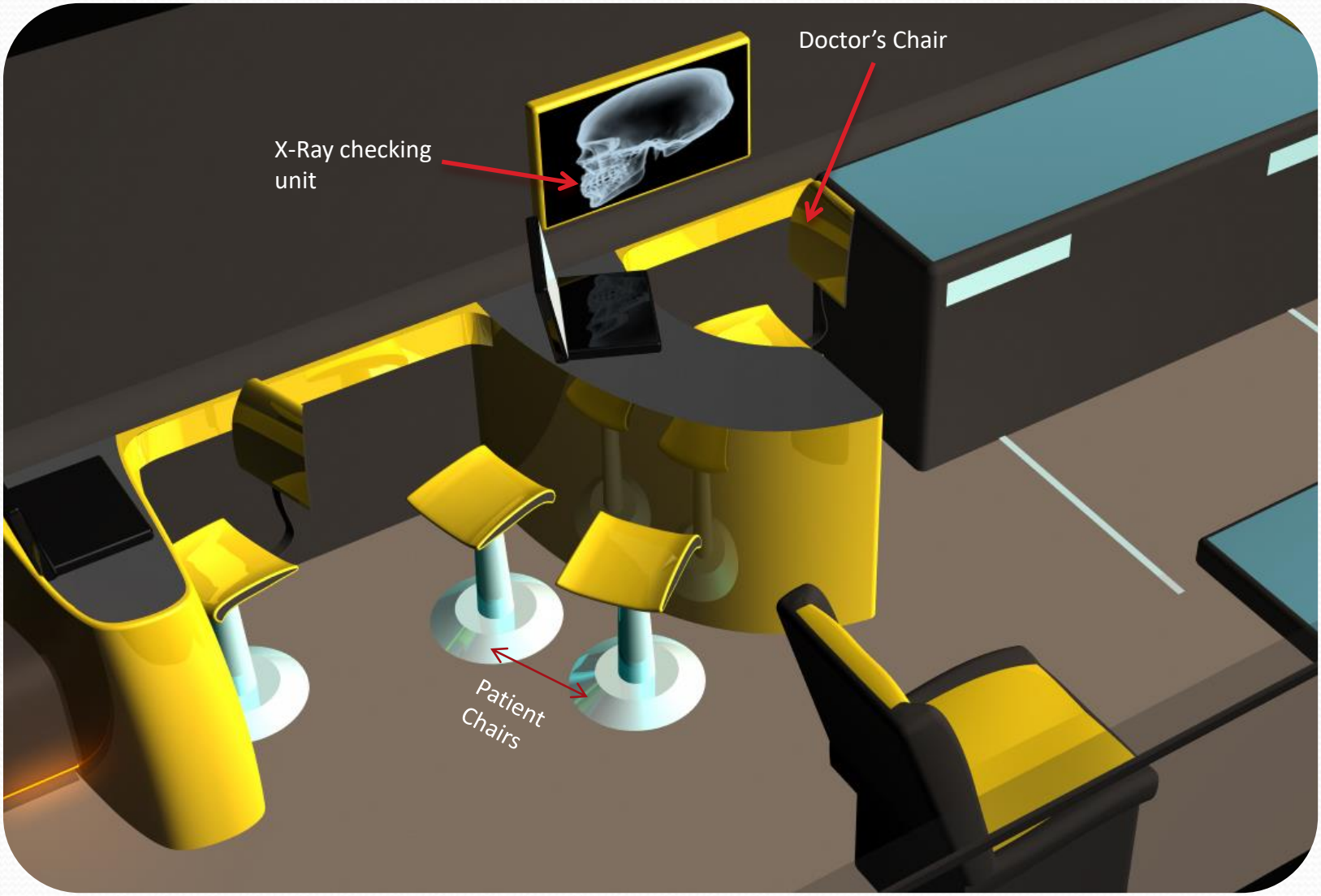


LED Lighting possibilities
On the floor

Top View

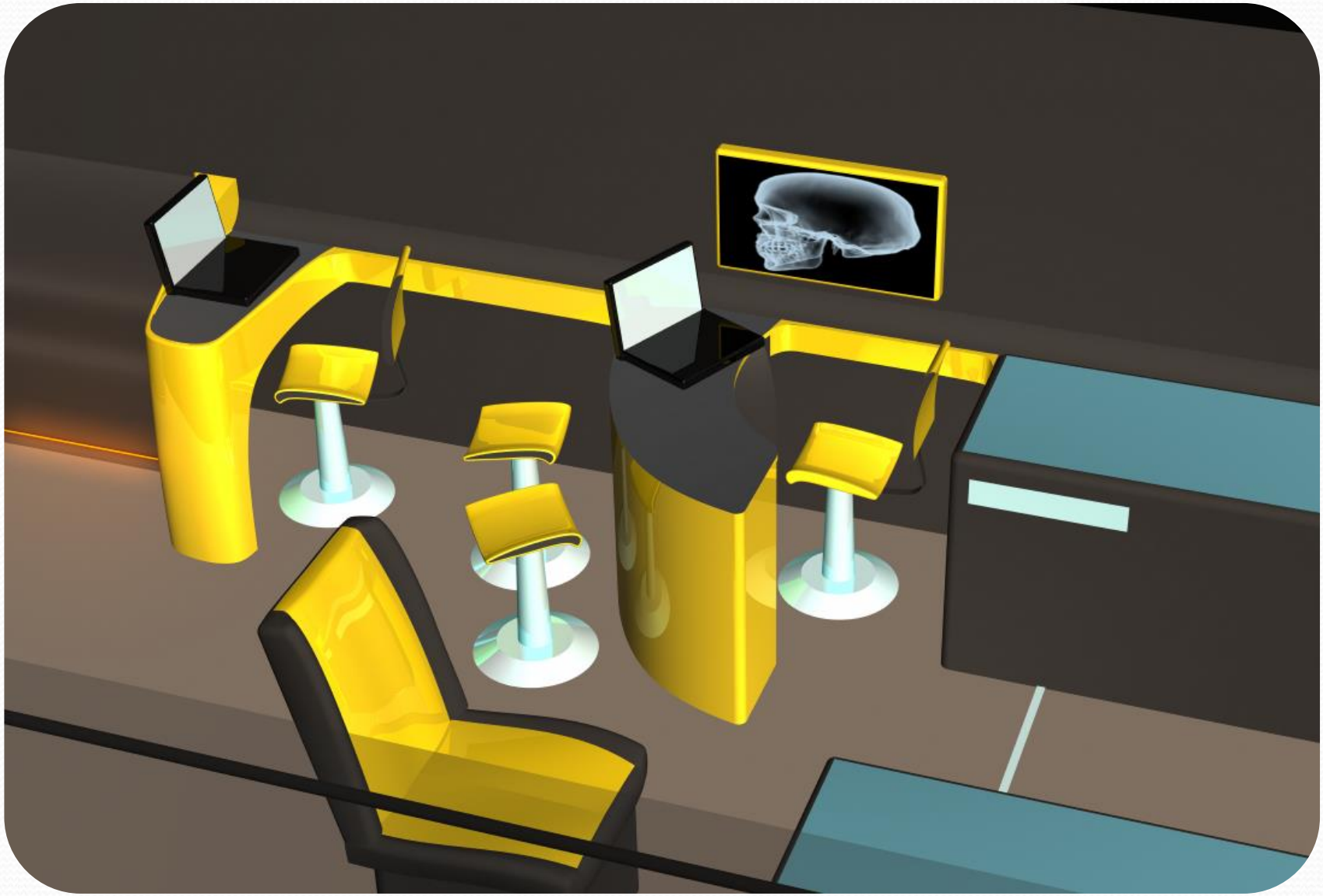


Doctor’s Table :

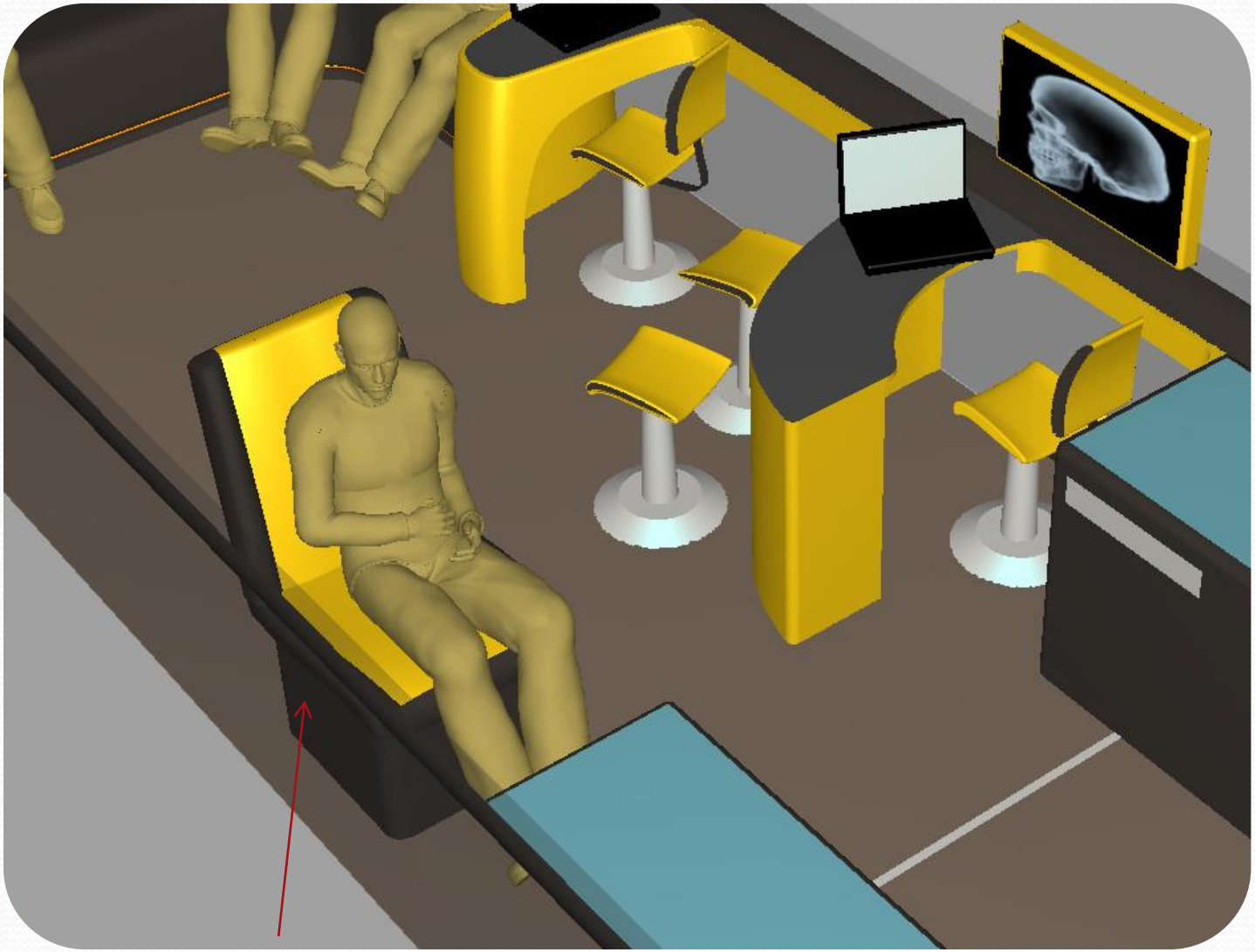


Above pic shows the doctors table with two chairs for visiting patients. There will be a X-ray checking unit on the side integrated within the wall. Also there is space for laptop on the doctors table.

Doctor’s Table :

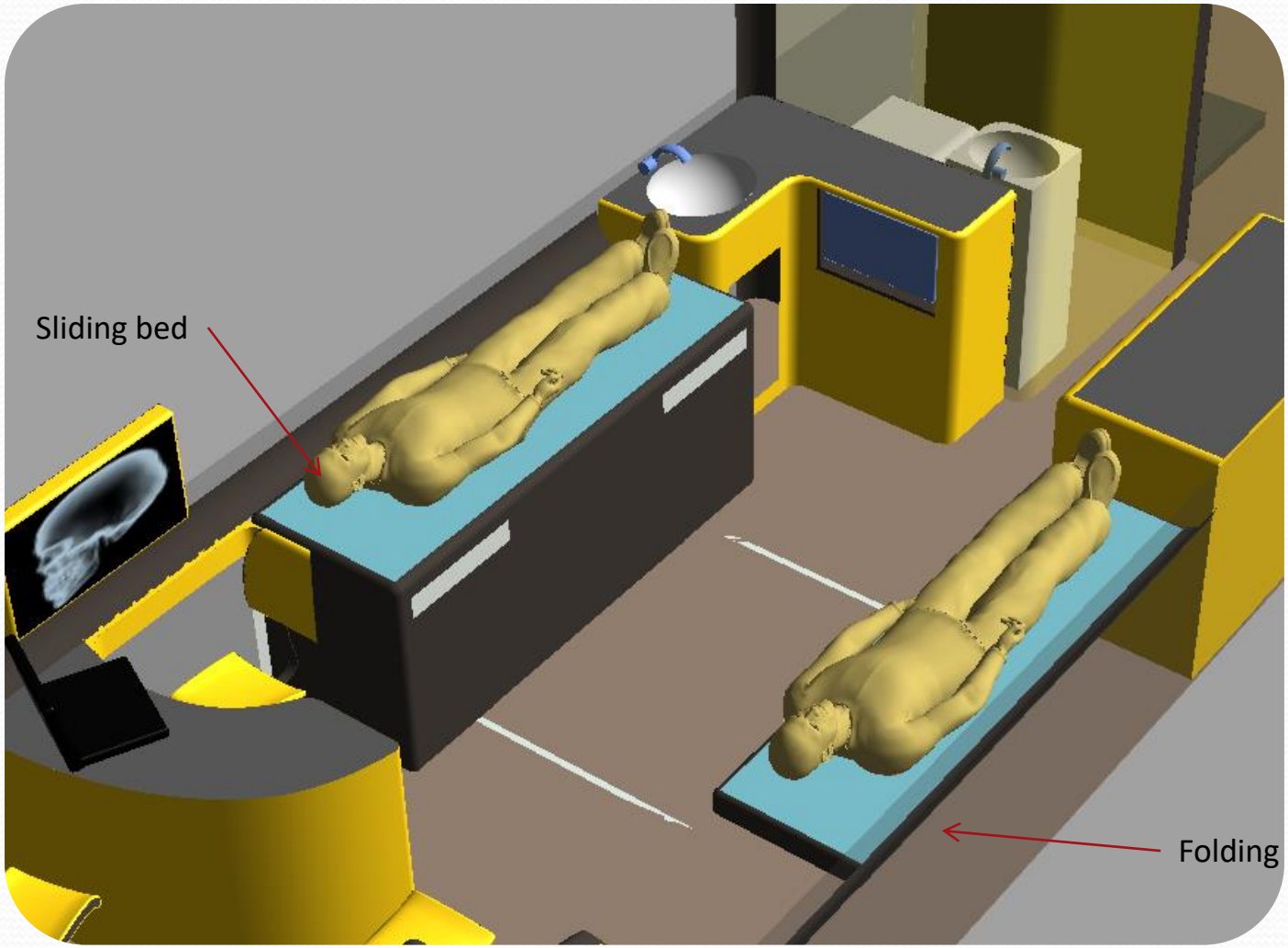


Dental Check up chair :



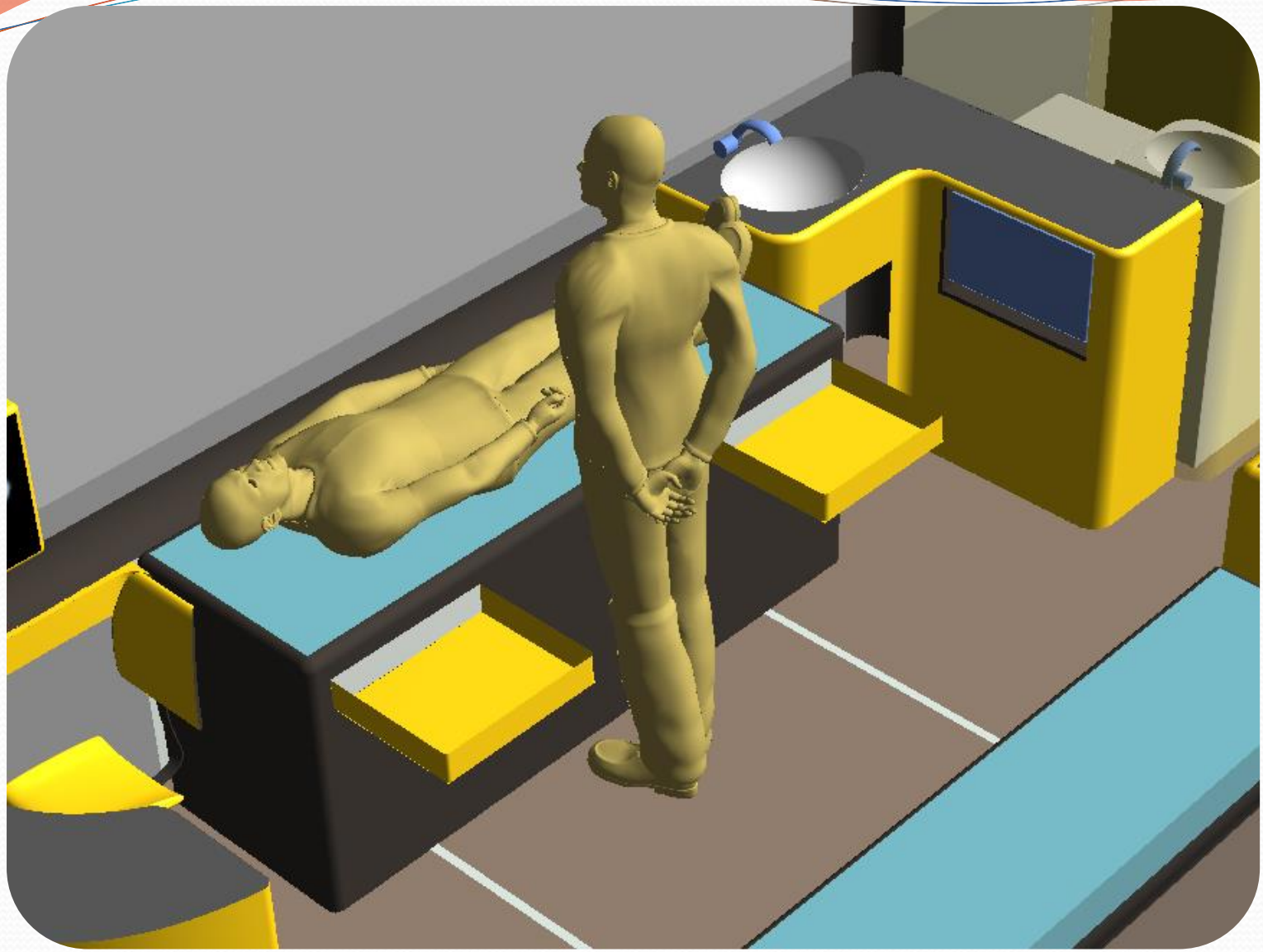
This is a Reclining chair which will be used for Dental and E&T Checkups.

Patient Beds:



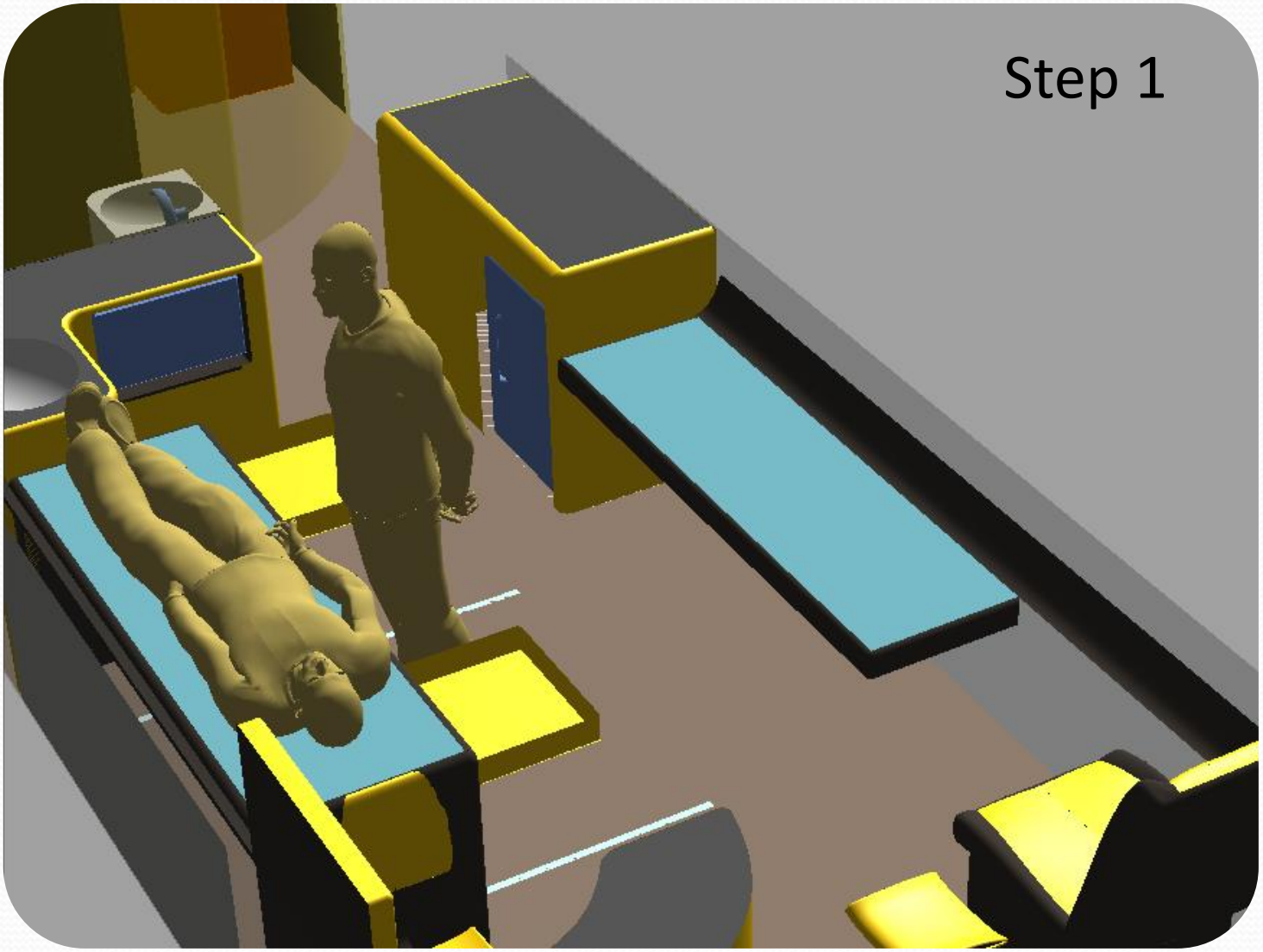
There are 2 patient beds on either sides of the bus one of which can slide to the centre of the bus on the two rails provided on the floor and become a main operation bed and the other bed can fold down to merge within the wall.

ECG & Ultrasound Units :



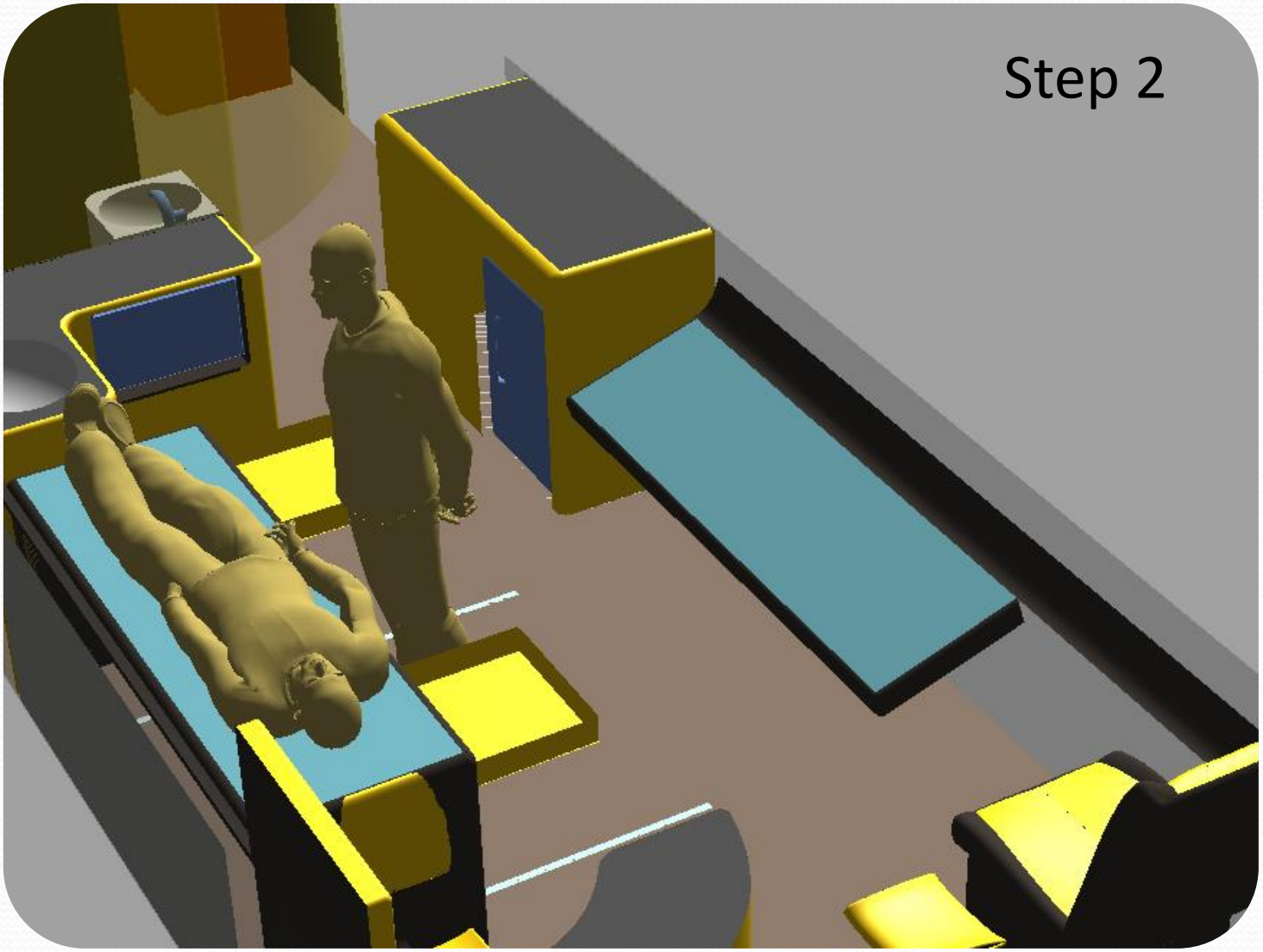
Within the Bed there will be sliding drawers which will hold the ECG & Ultra sound machine. The doctor can just open the drawer do the check up with the machine and slide the machine back into the bed.

Folding bed:

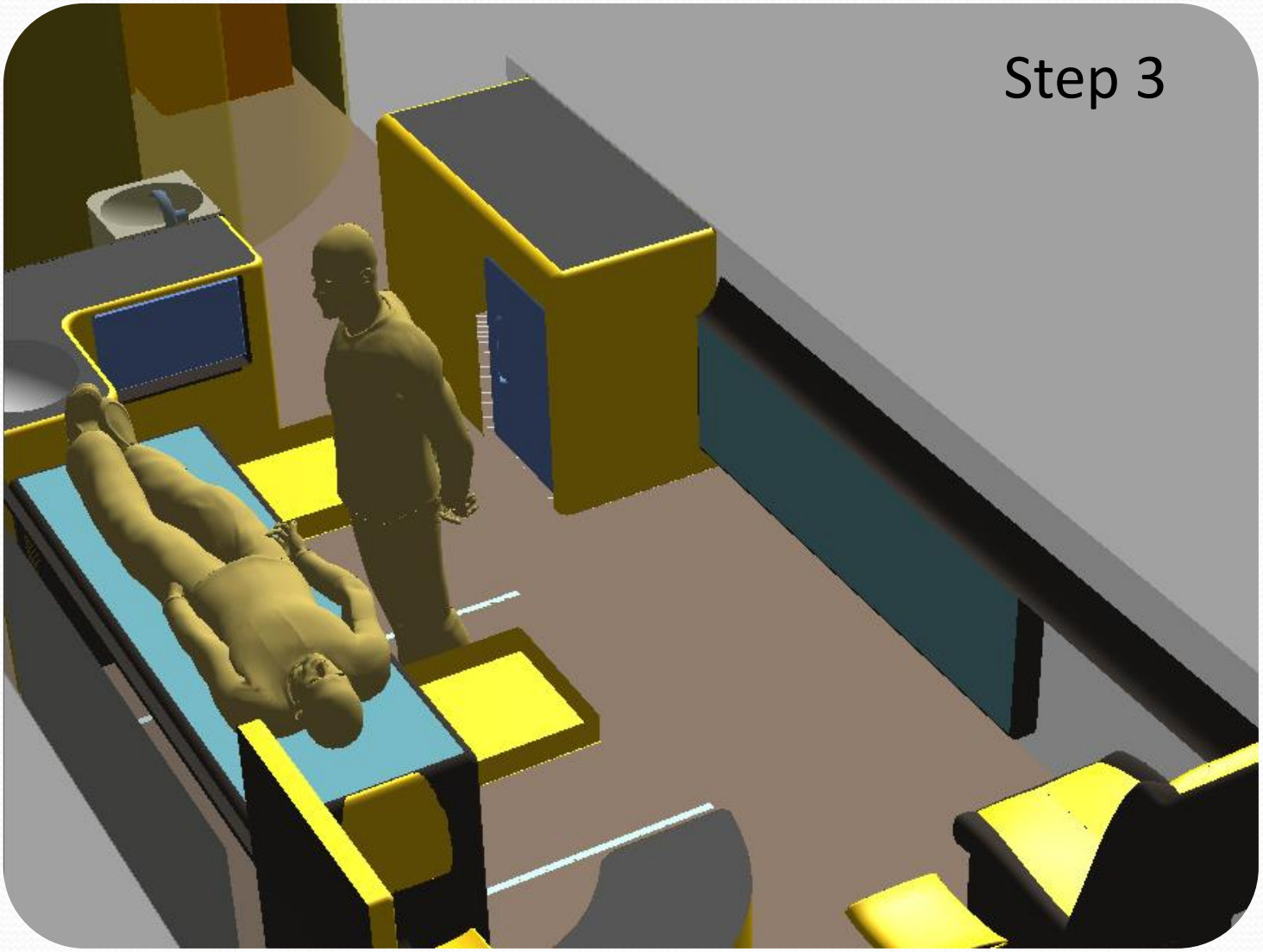


There are 2 beds on either sides one is foldable bed which folds and merges with the side wall while the other is a sliding bed which moves to the centre of the bus and becomes a operation theatre bed.

Folding bed:

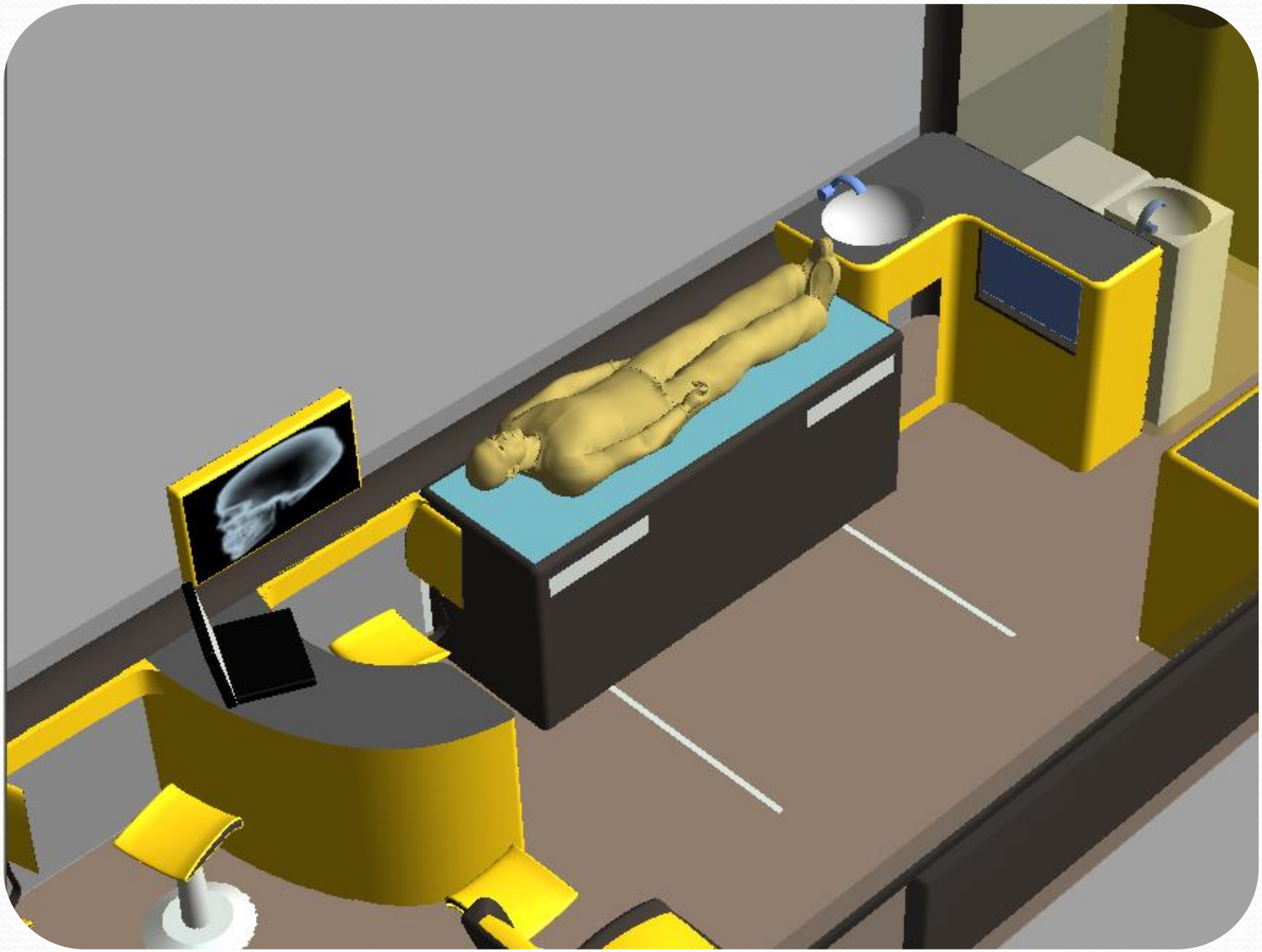


Folding bed:



Once the Bed fully folds down it gets integrated within the side wall. Only after the side bed folds down the main bed can be moved to the centre of the bus.

Patient Beds : Operation Theatre mode



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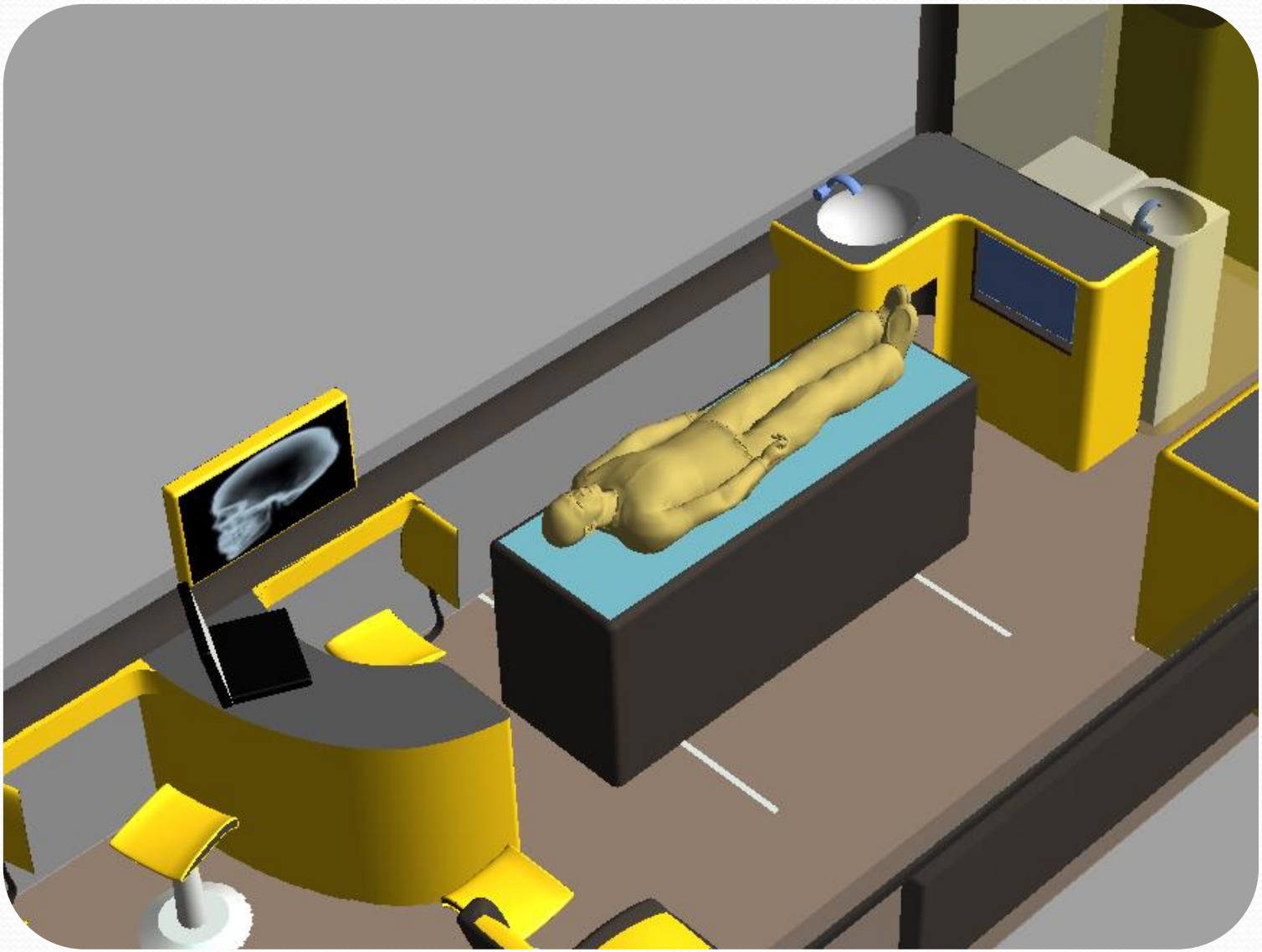
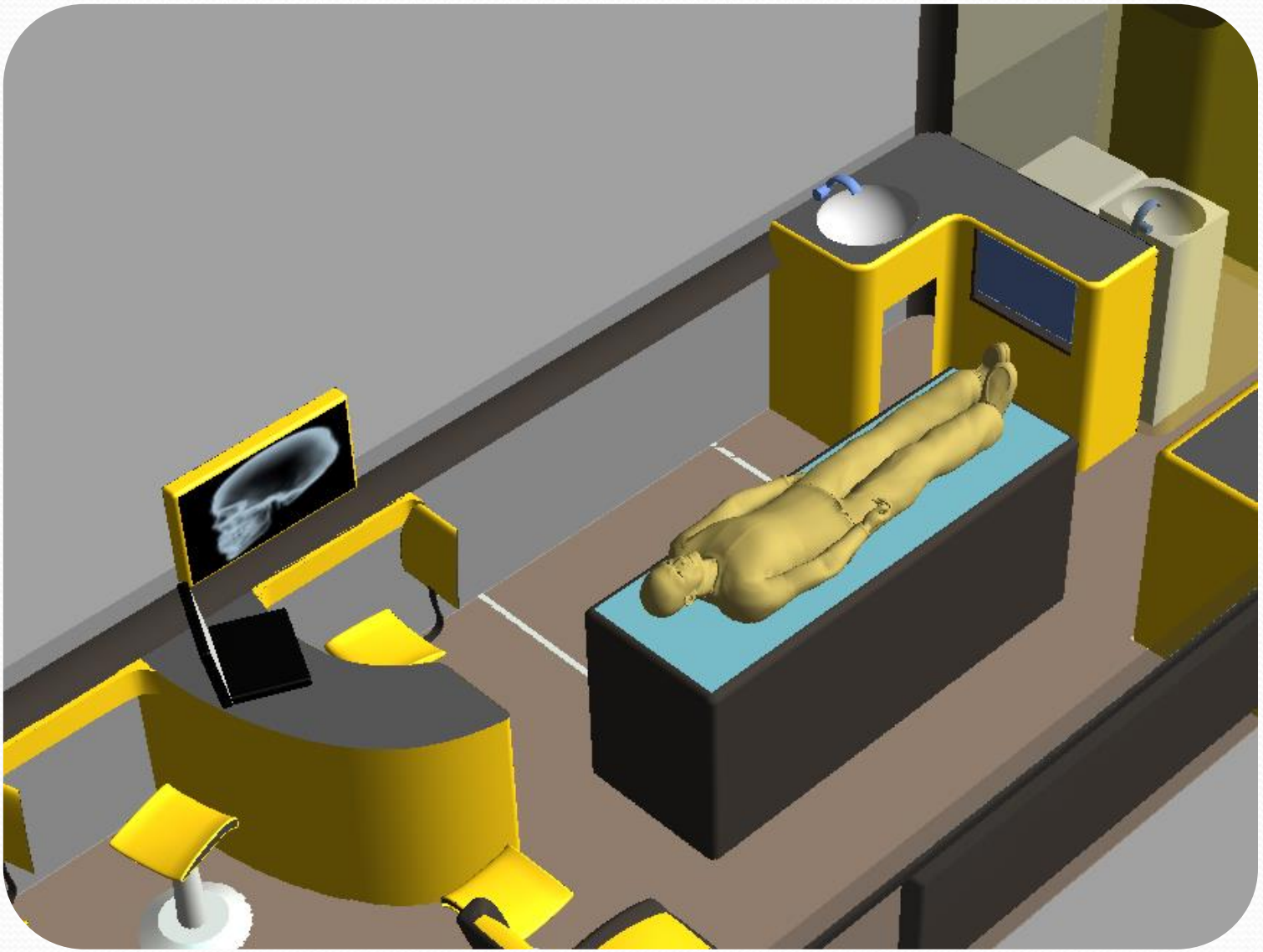
Patient Beds : Operation Theatre mode



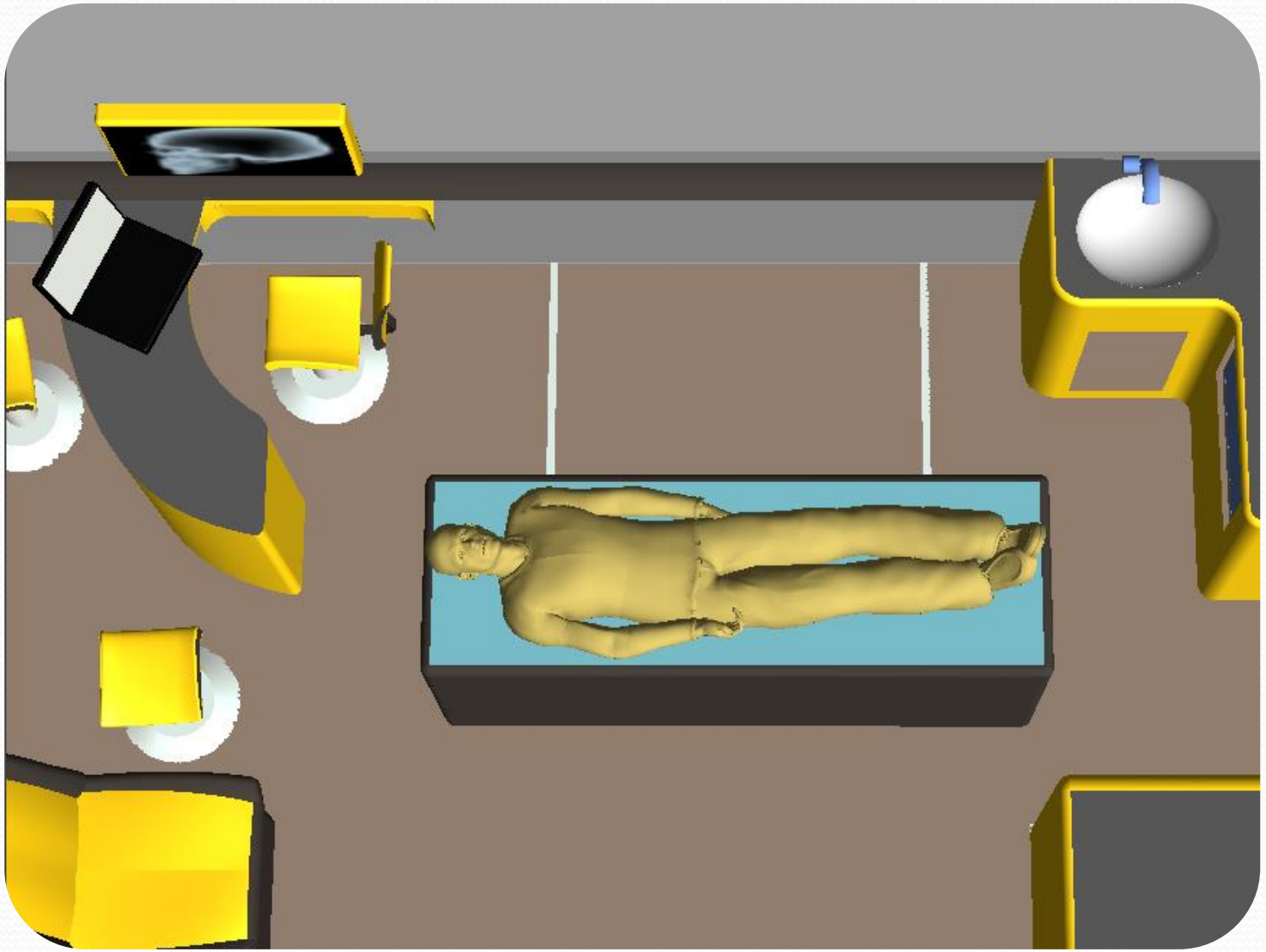
The sliding bed can be pulled manually or it will be provided with a motorized sliding mechanism.

Patient Beds : Operation Theatre mode



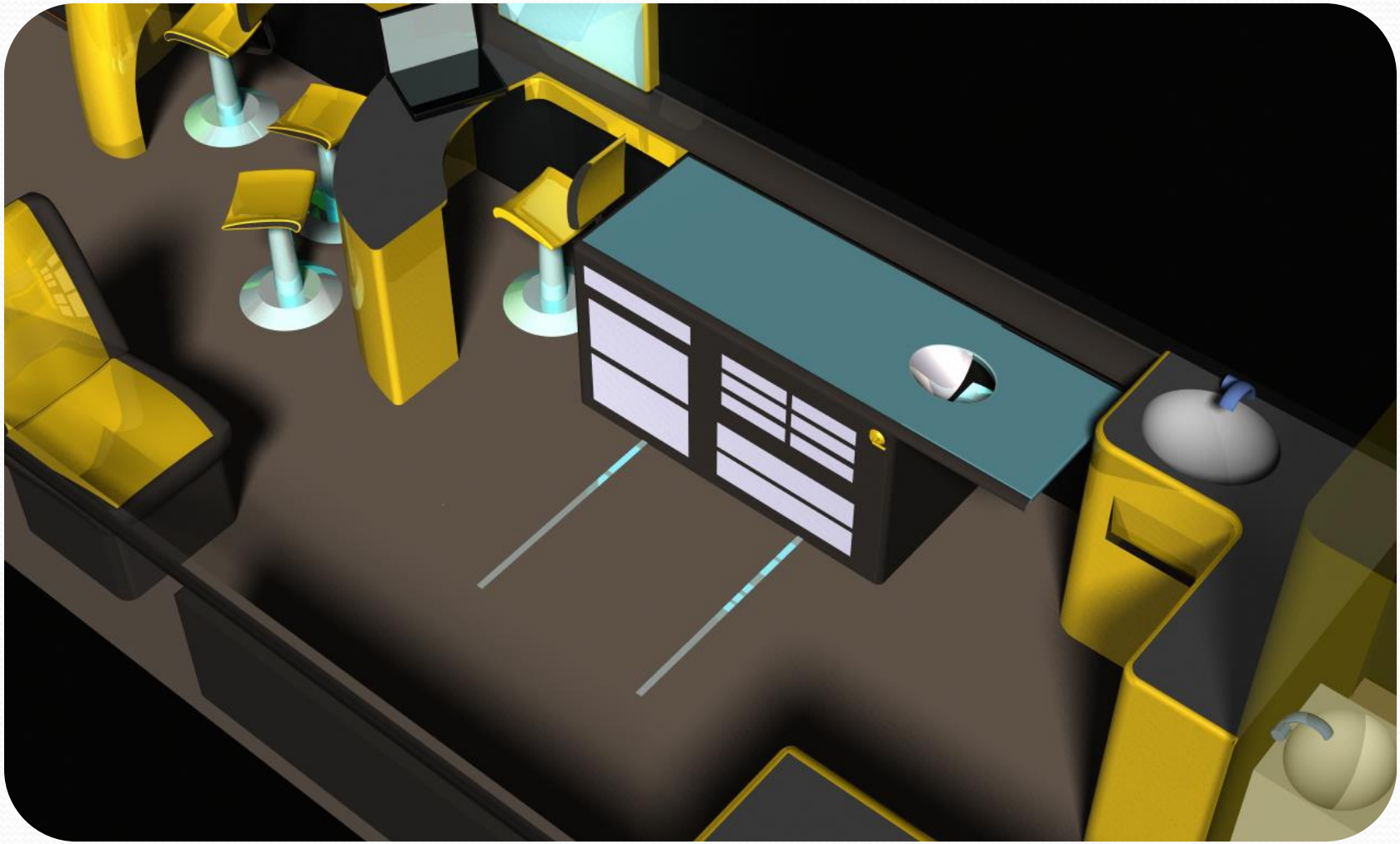
The bed slides on the tracks provided on the floor and moves to the centre of the bus.

Patient Beds : Operation Theatre mode



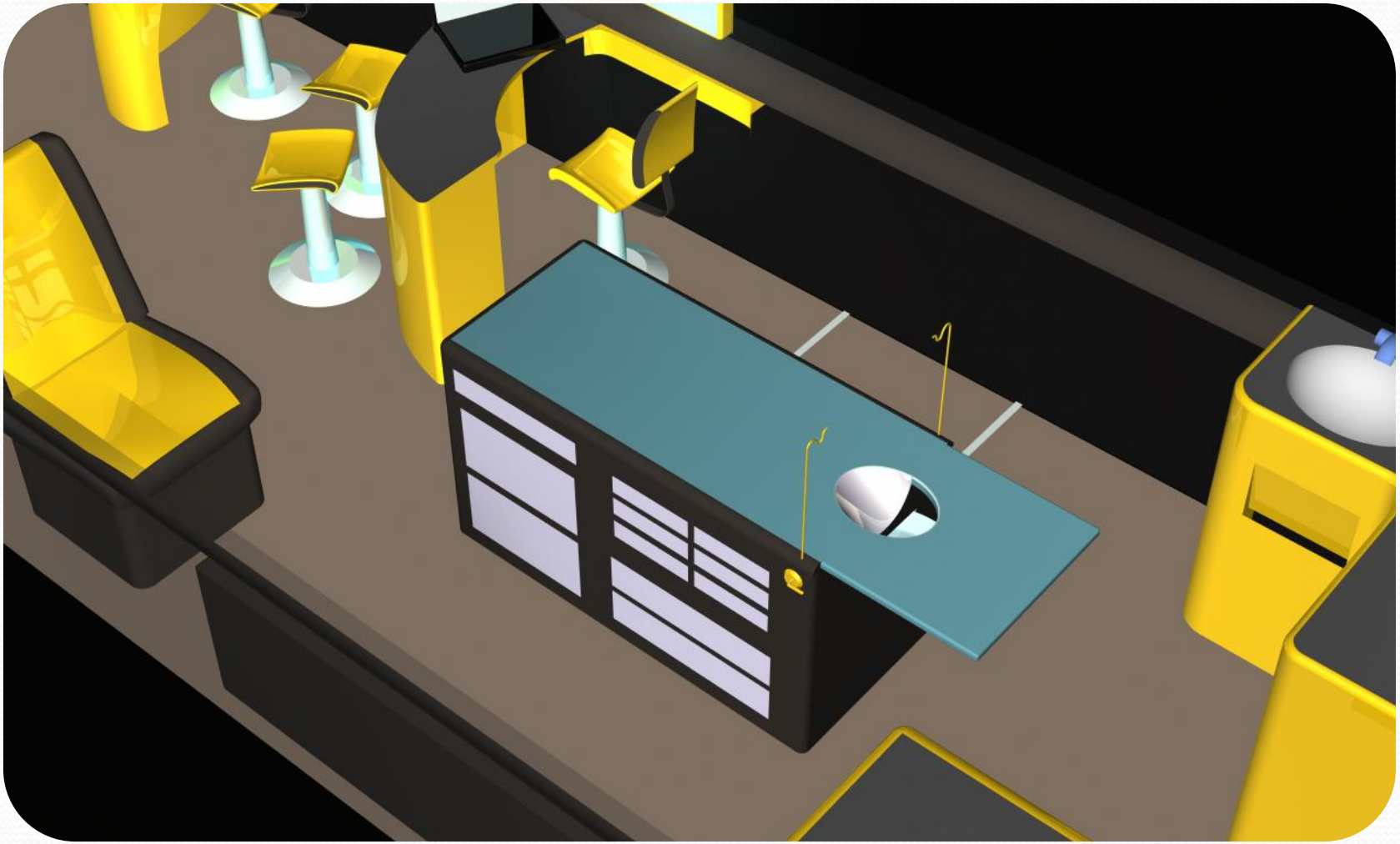
Once the main bed is moved to the centre we get 360 degrees free space around it which is ideal for carrying out small surgical procedures. The bed will also be provided with straps to hold the patient firmly in case he is being transported to some place after a medical procedure.

Patient Beds : customized



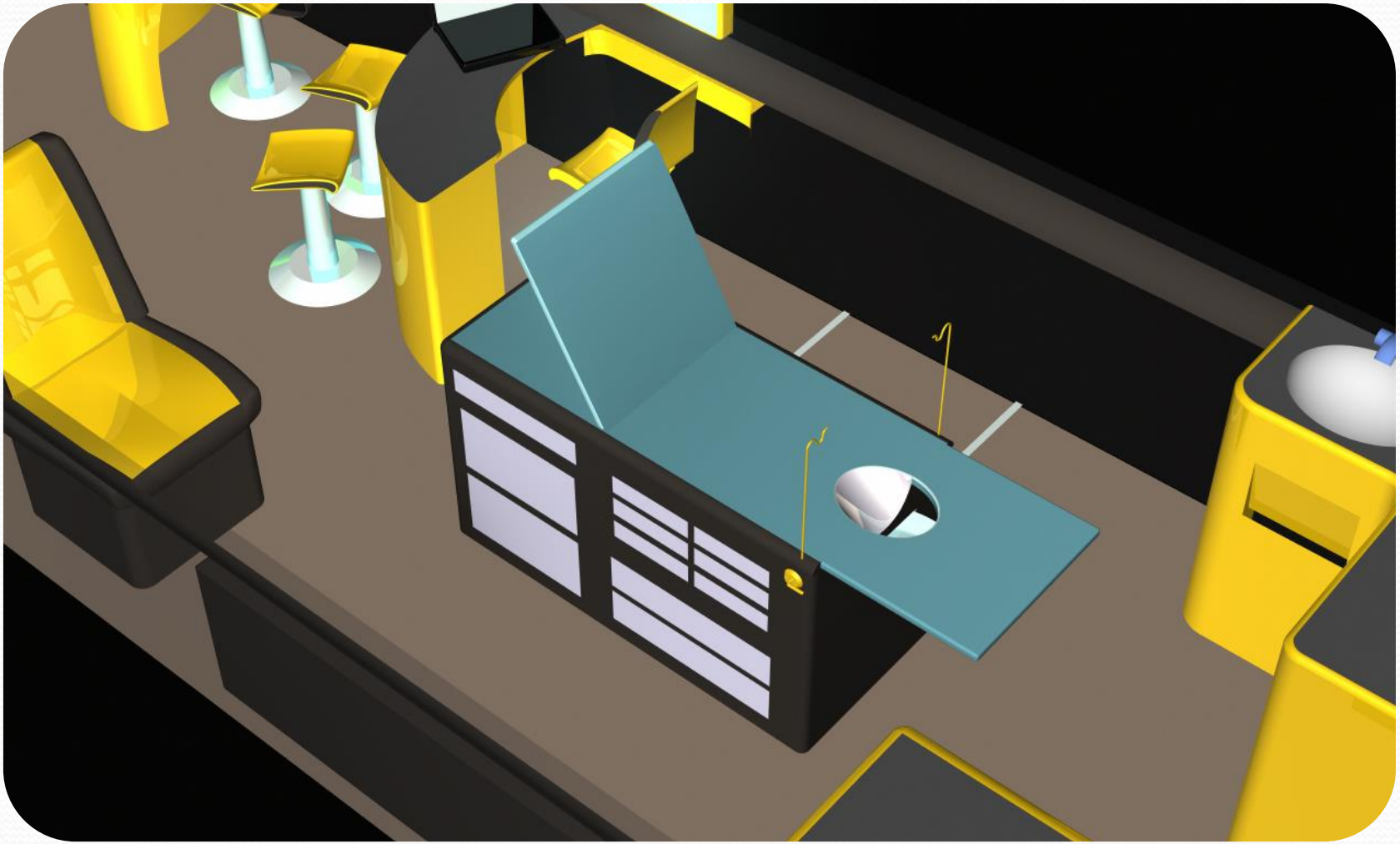
The operation bed needed to have some adjustability so that it could provide backrest and also it could be used for Gynec examinations.

Main Operation bed moved to the centre:



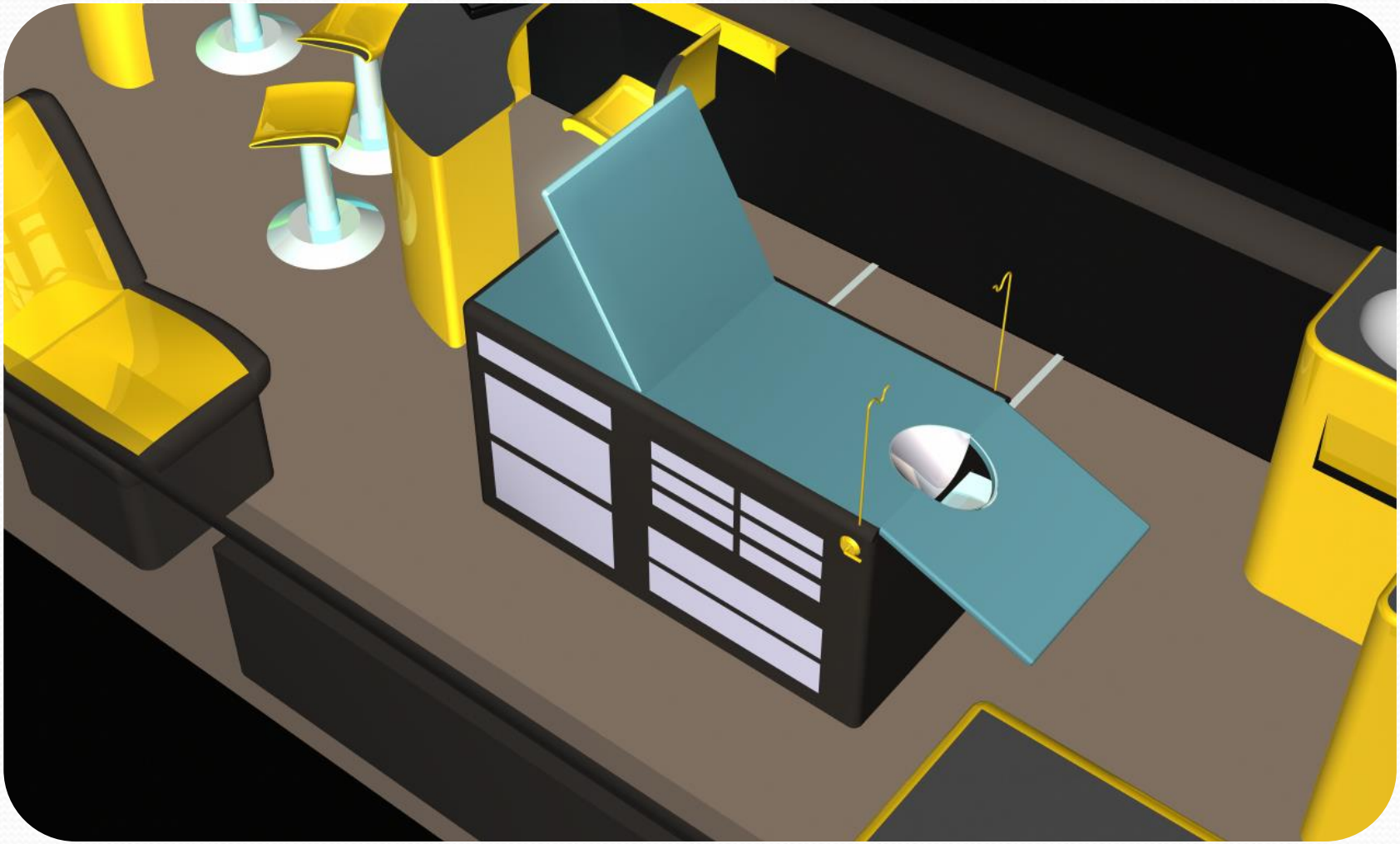
The bed will have foldable ends for head and leg supports.

Back rest folds on top



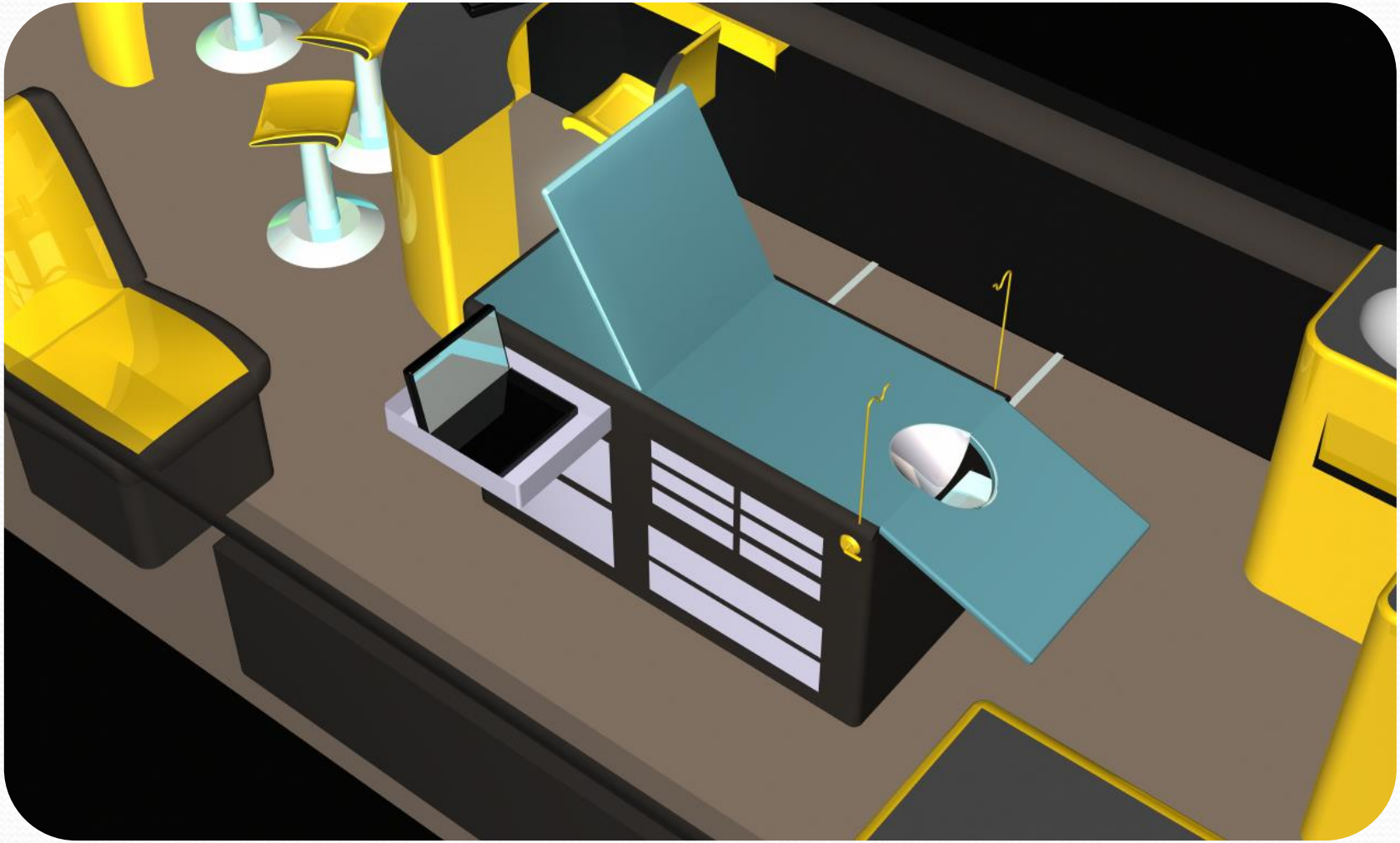
The backrest will be provided with a mechanism so that the angle of inclination can be set according to requirement.

Leg rest folds down :



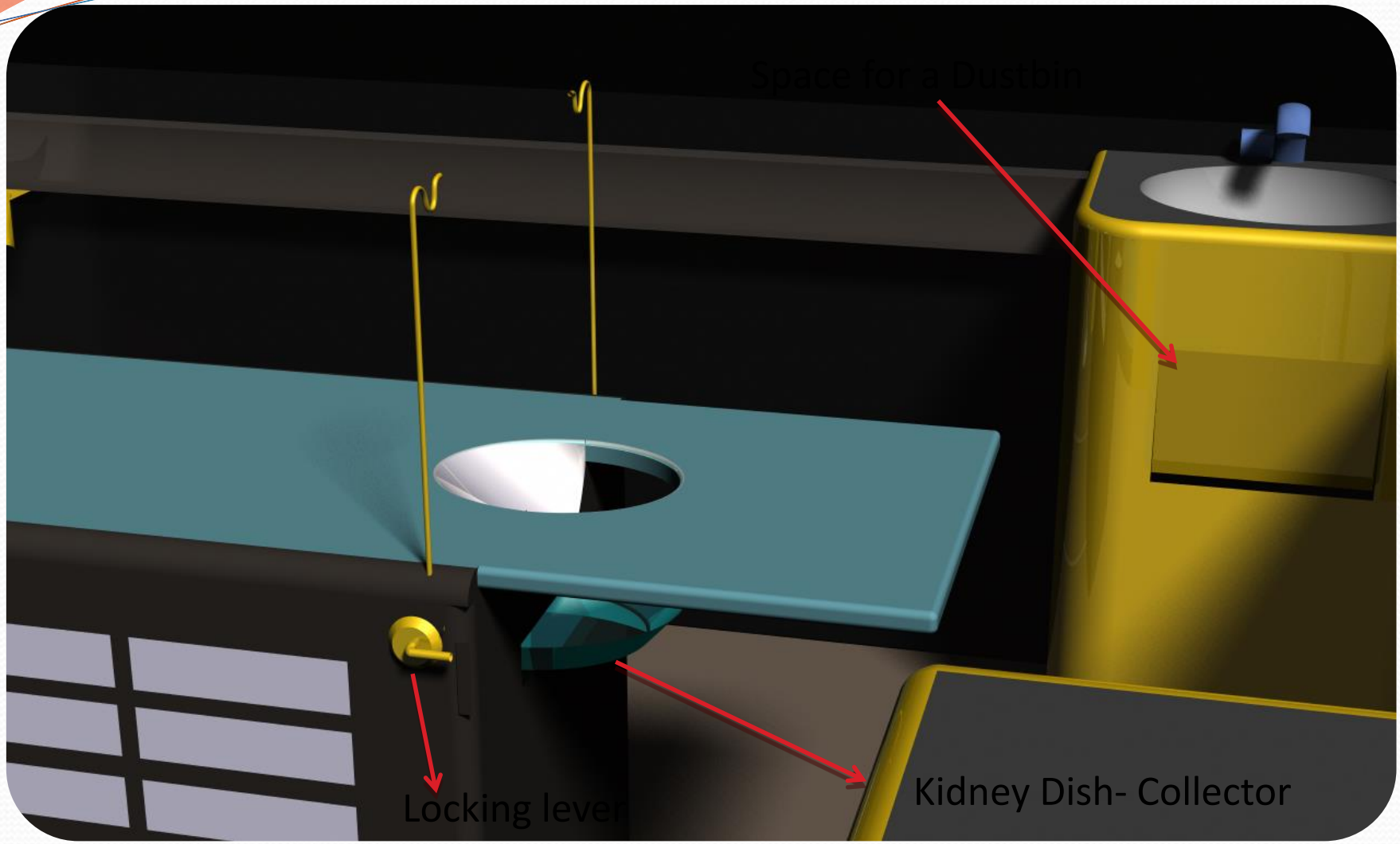
The leg rest is also adjustable to any inclination.

Ultrasound Unit within the drawer



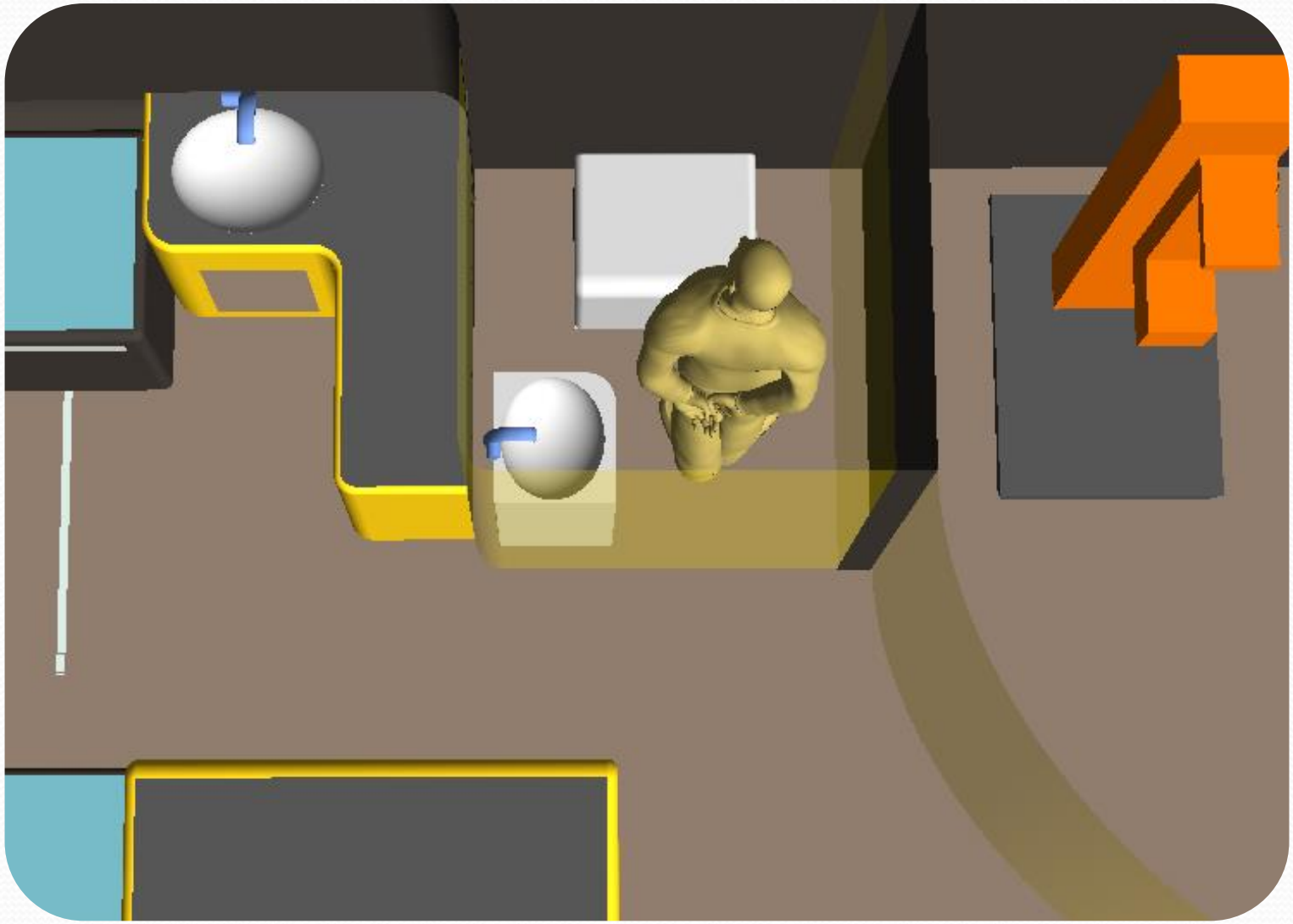
The ultrasound unit will be held within a drawer in the bed. Whenever required the drawer can be opened to access the machine

Close up of the Bed

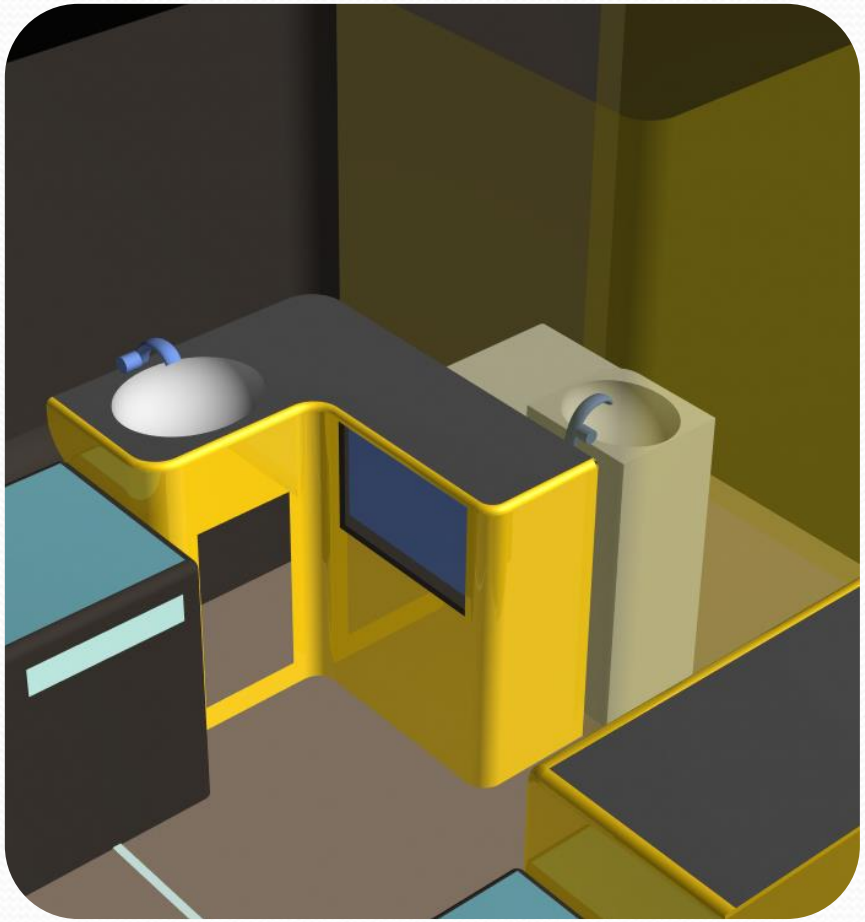


There will be two vertical rods provided at the foot end of the table. The top ends of these rods are curled up to form a hook which holds the belts for leg support during Gynec examination. These vertical rods have adjustable height and can be locked to any position with the locking lever provided on the side. After use they can be removed and stored separately. The Bed has a receptacle at one end and below the receptacle there is a kidney dish collector.

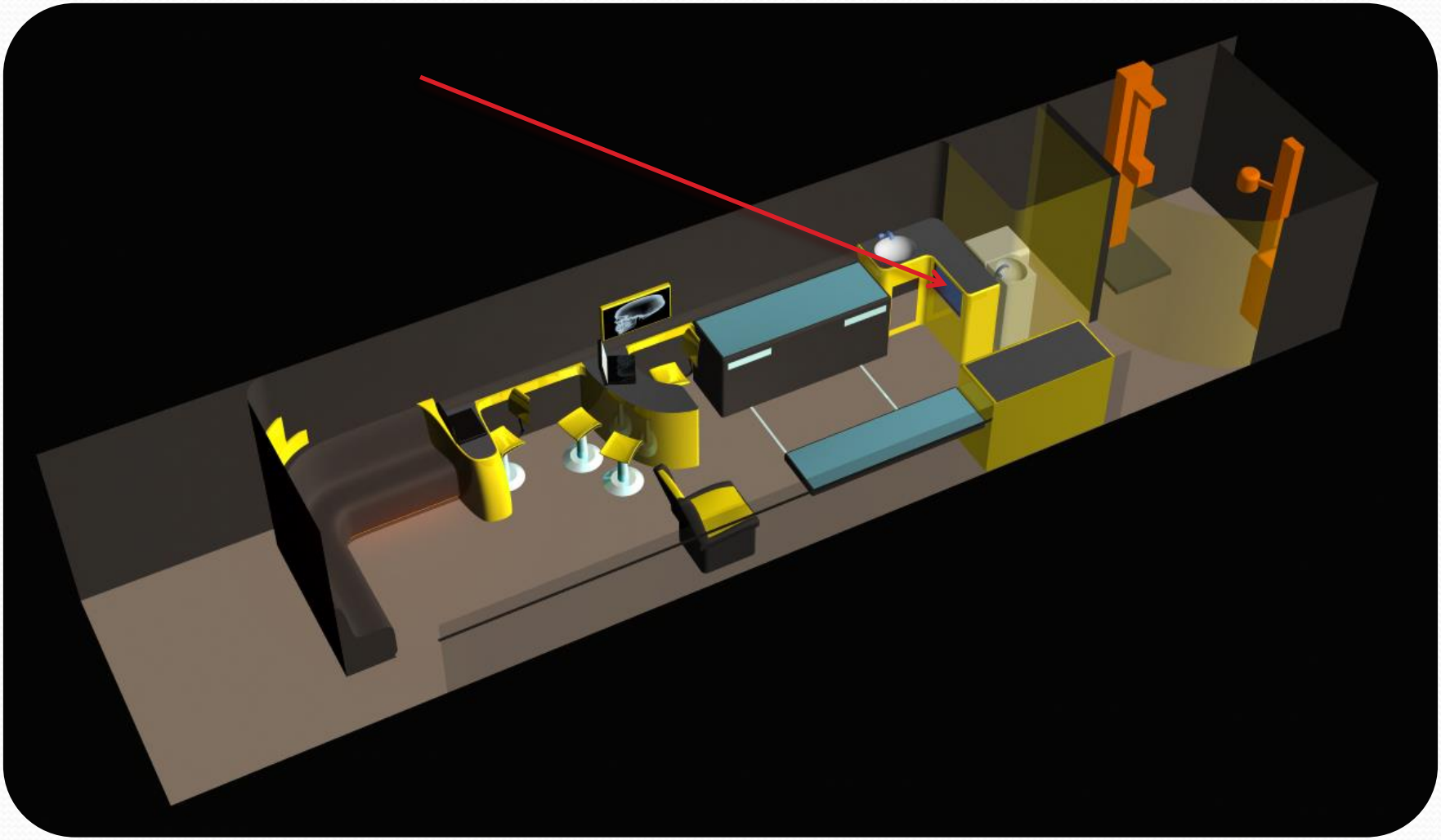
Toilet area & wash basin



Toilet area & wash basin



Pantry area :



Pantry Equipments :

Microwave :

Basic space requirement :
L x B x H = 450 x 330 x 270

Coffee Machine :

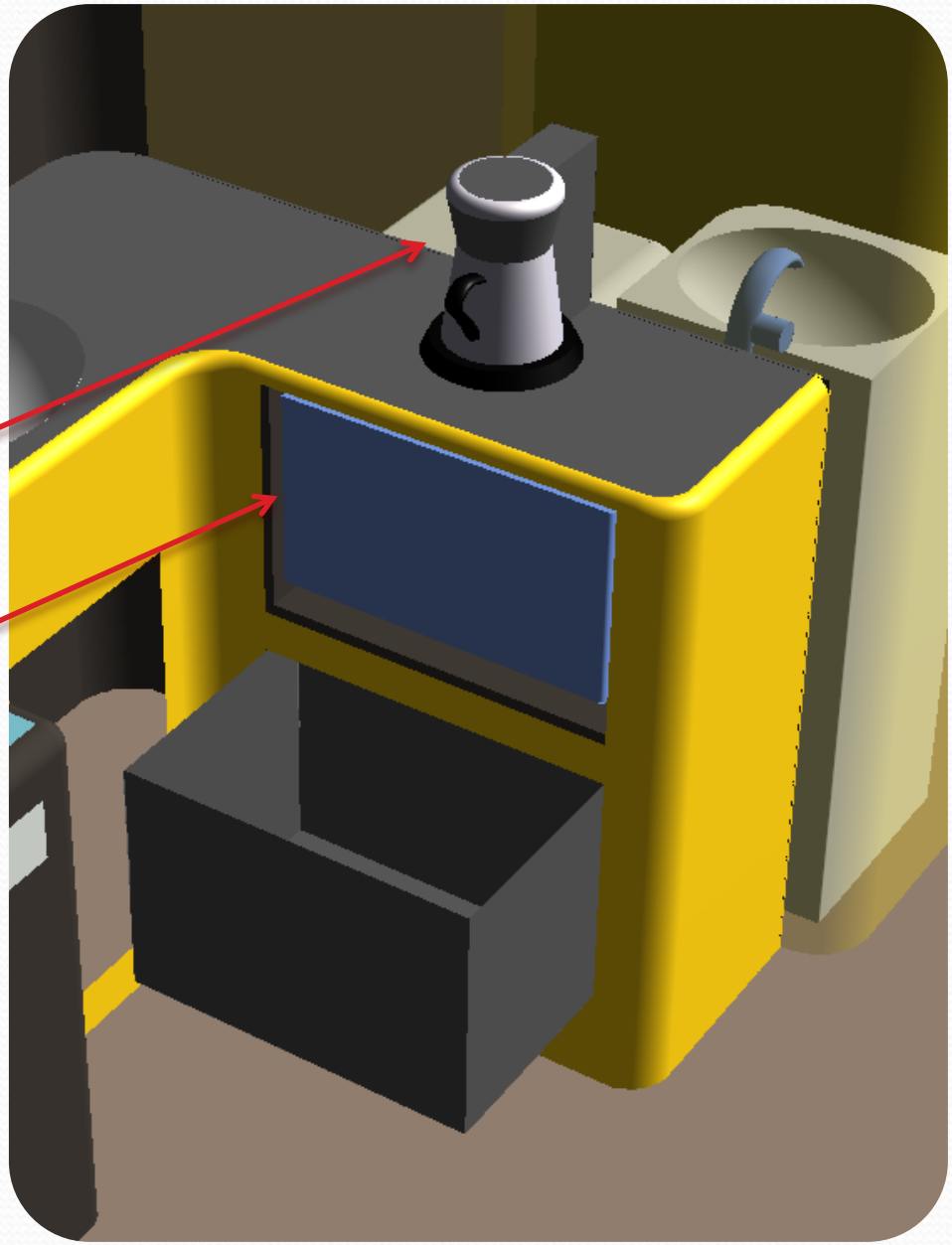
Basic space requirement :
L x B x H = 350 x 330 x 300

Pantry area :

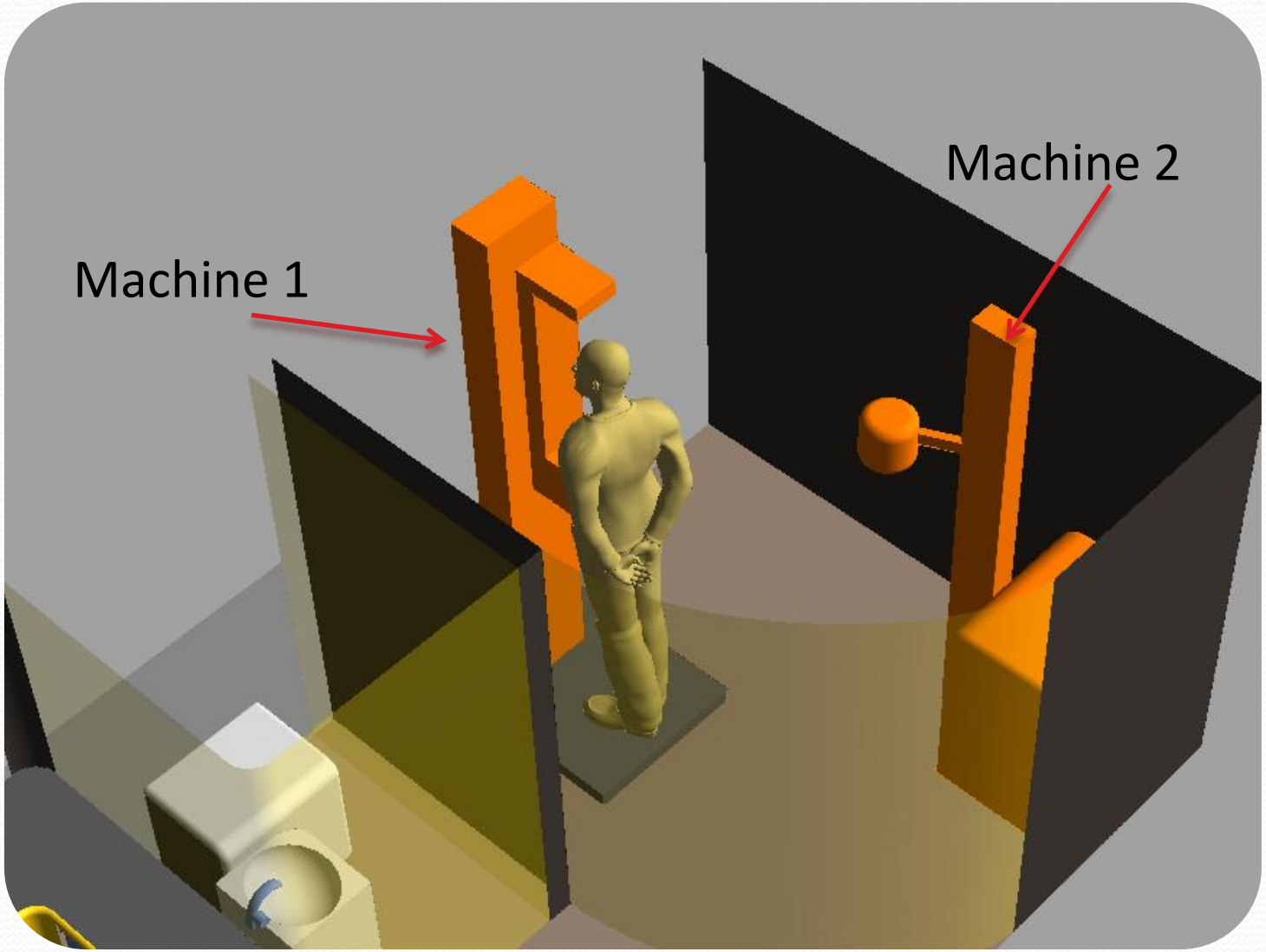
Pantry storage

Drawer size :

L x B x H = 480 x 300 x 300 mm

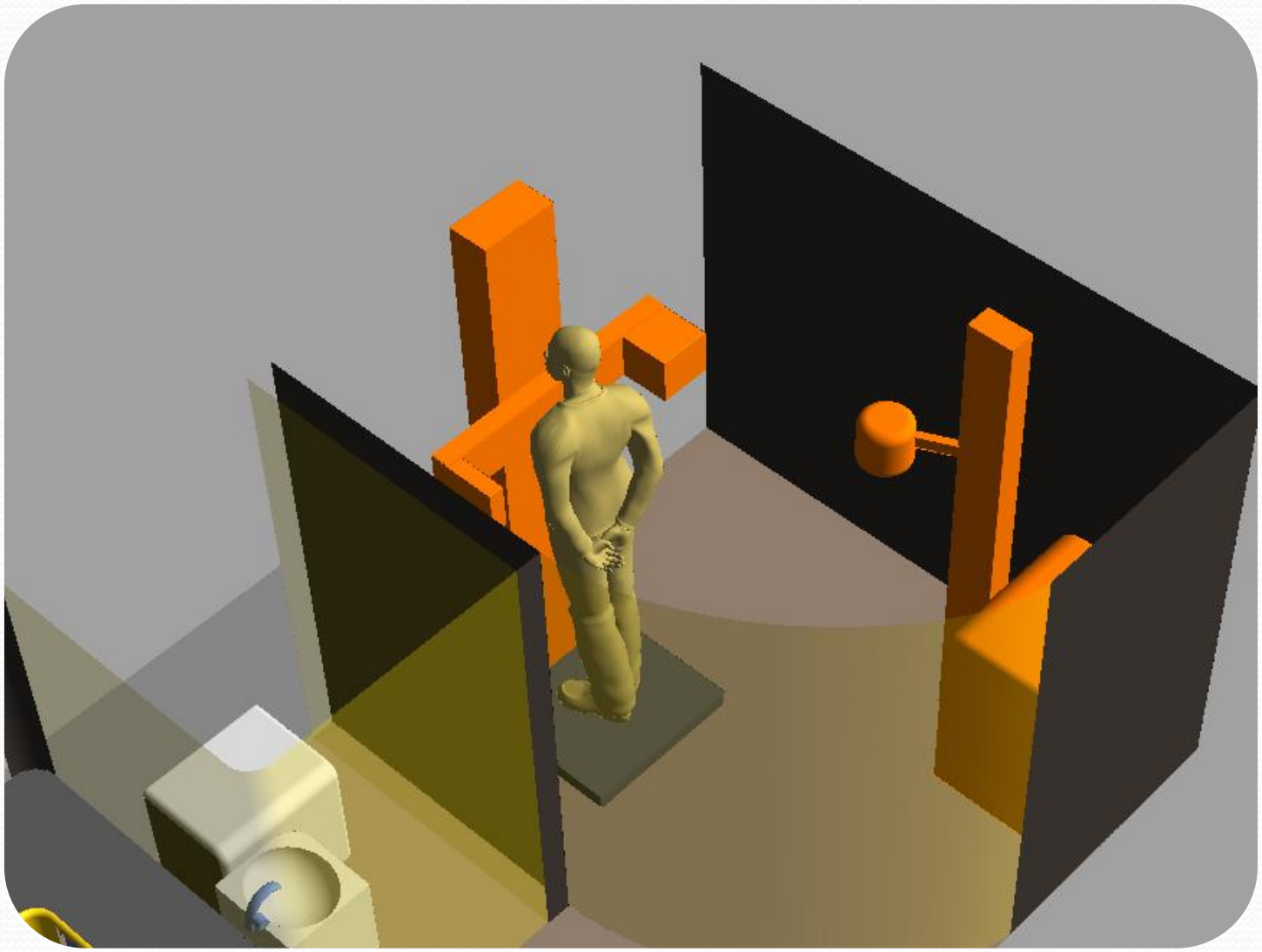


X-Ray Lab



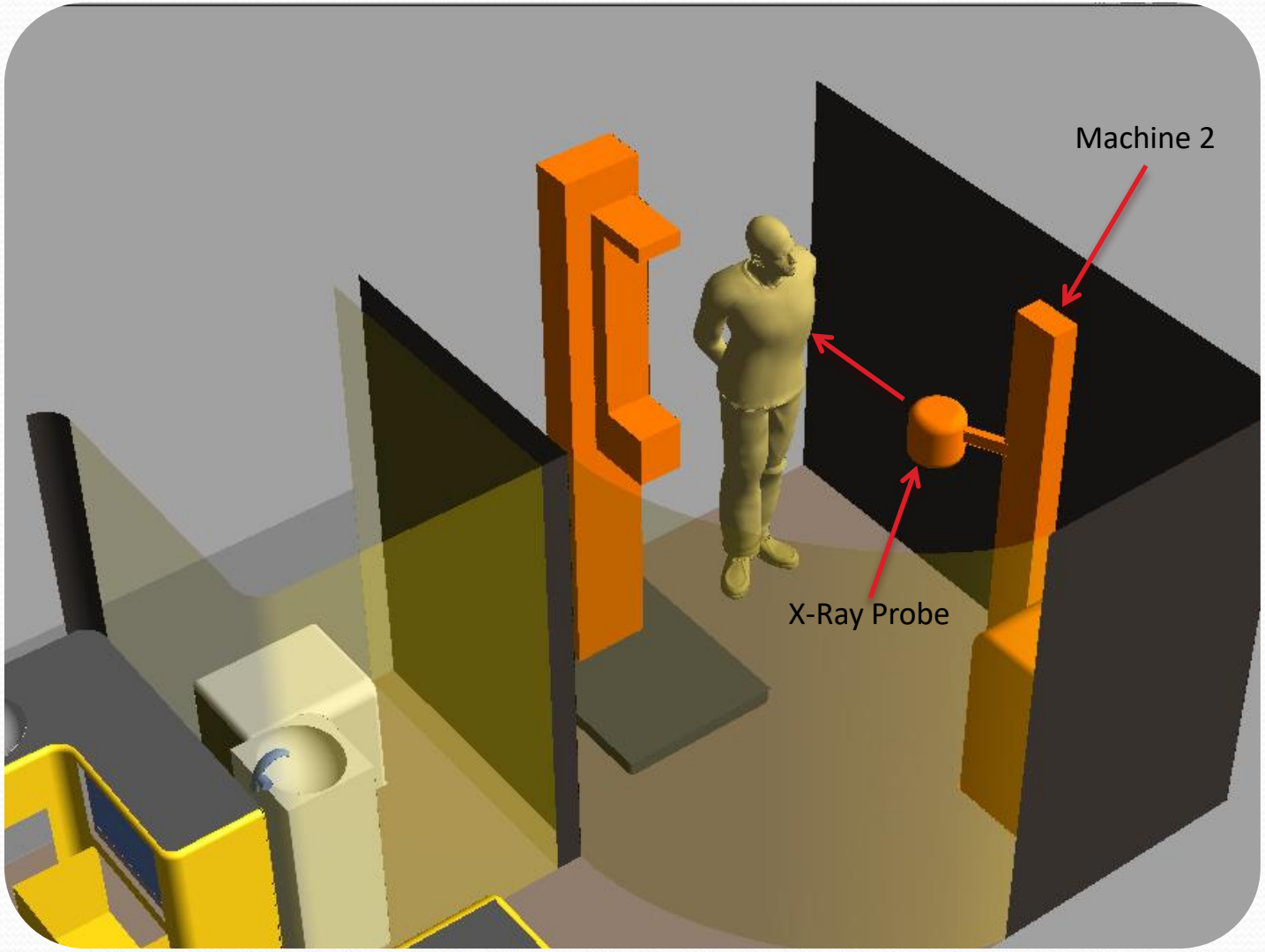
Machine 1 is a mammography machine which has a “C” shaped swiveling arm which is in vertical position when machine is not in use.

X-Ray Lab :



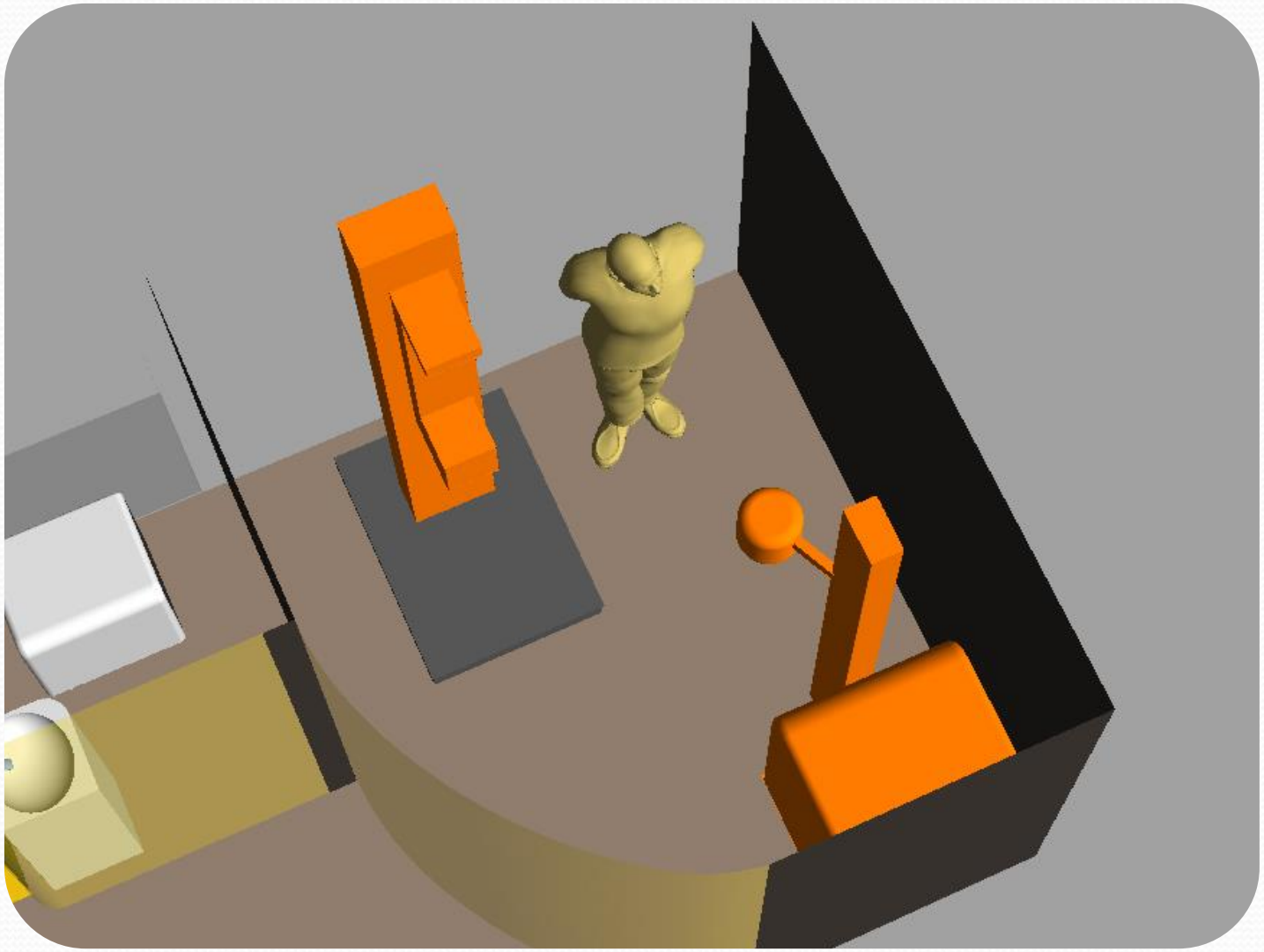
When in use the arm swivels to a horizontal position and the person stands in between the two ends of the arm and the checkup is done.

X-Ray Lab :



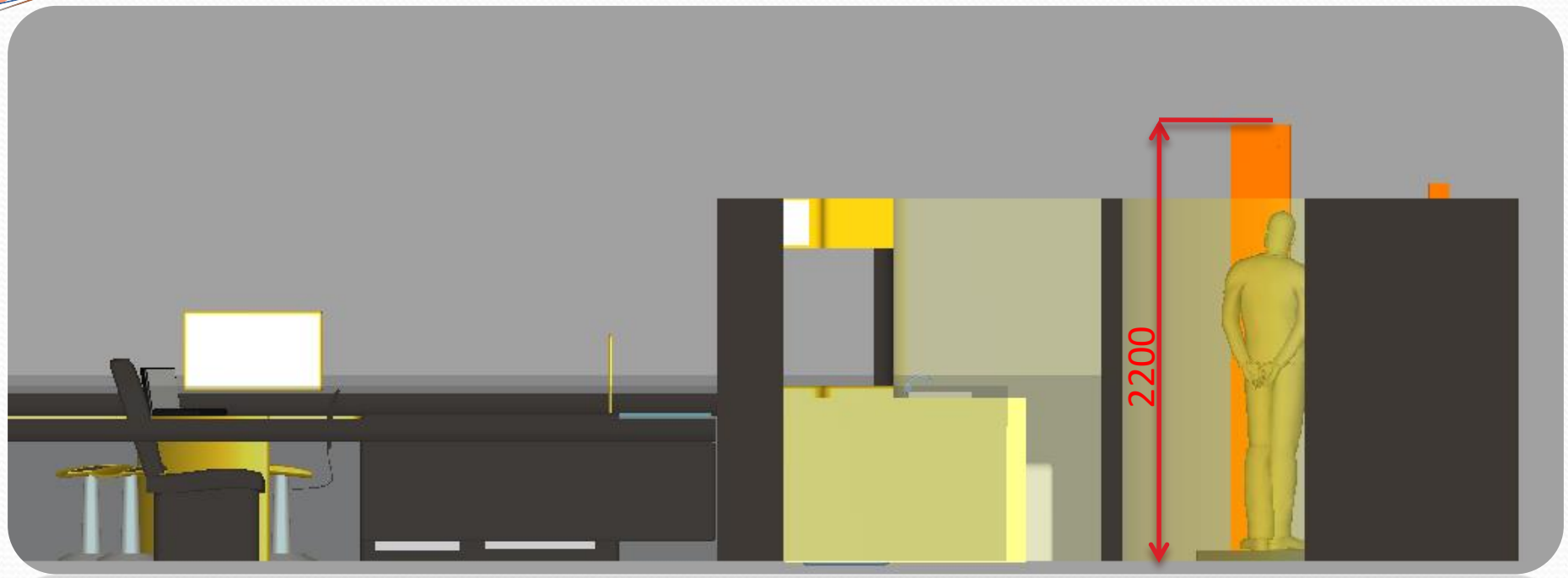
Machine 2 is a x-ray machine and the person has to stand about 4 feet away from the x-ray probe for any readings to be taken.

X-Ray Lab :



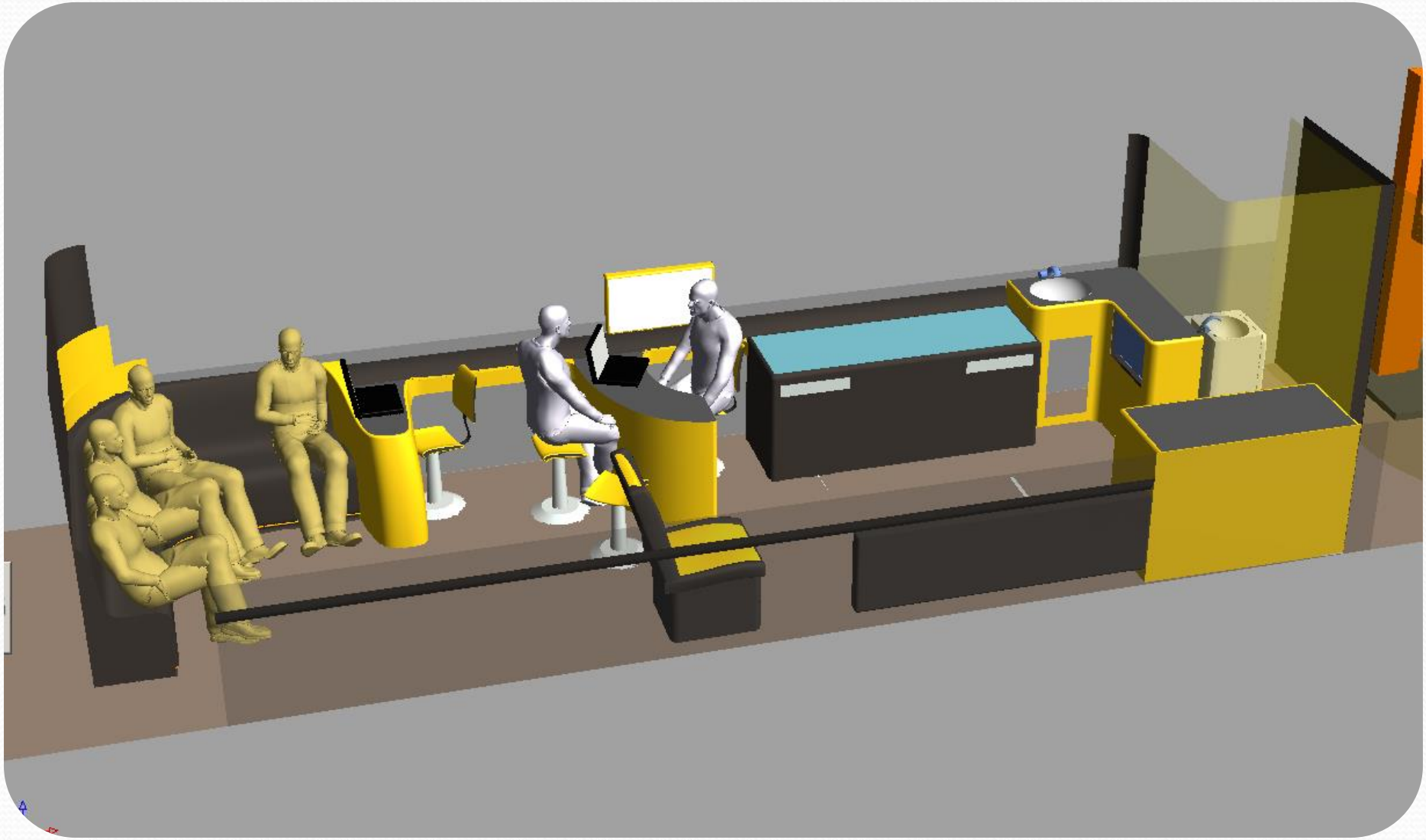
Machine 2 is a x-ray machine and the person has to stand about 4 feet away from the x-ray probe for any readings to be taken.

Machine 1: Height



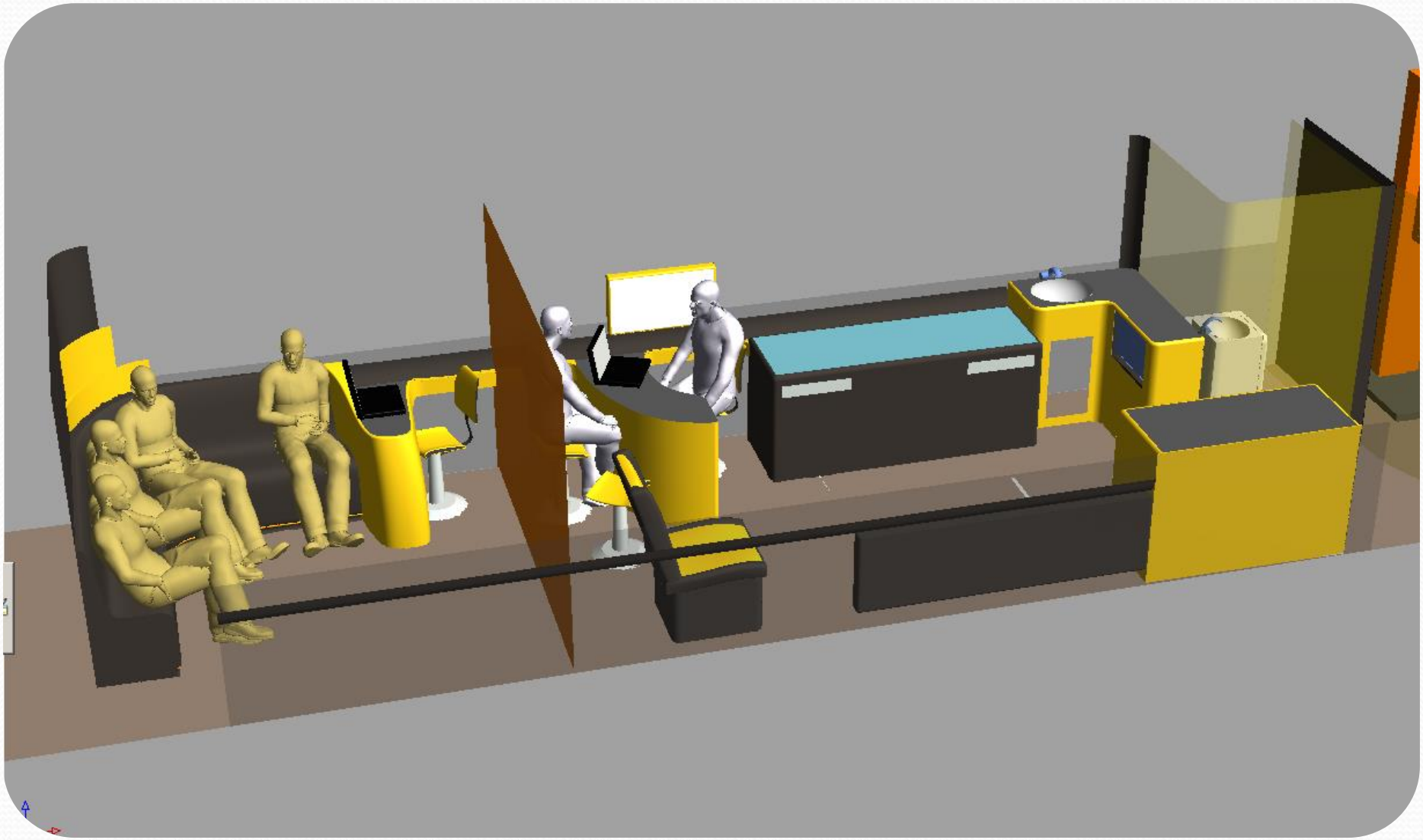
The Mammography machine has a height of about 2200mm which is large compared to normal height from the floor of the bus which is generally 1900mm So the rear end of the bus will be having hump with a larger height so as to compensate for the height of the machine.

Privacy : When the Doctor is talking with his patient

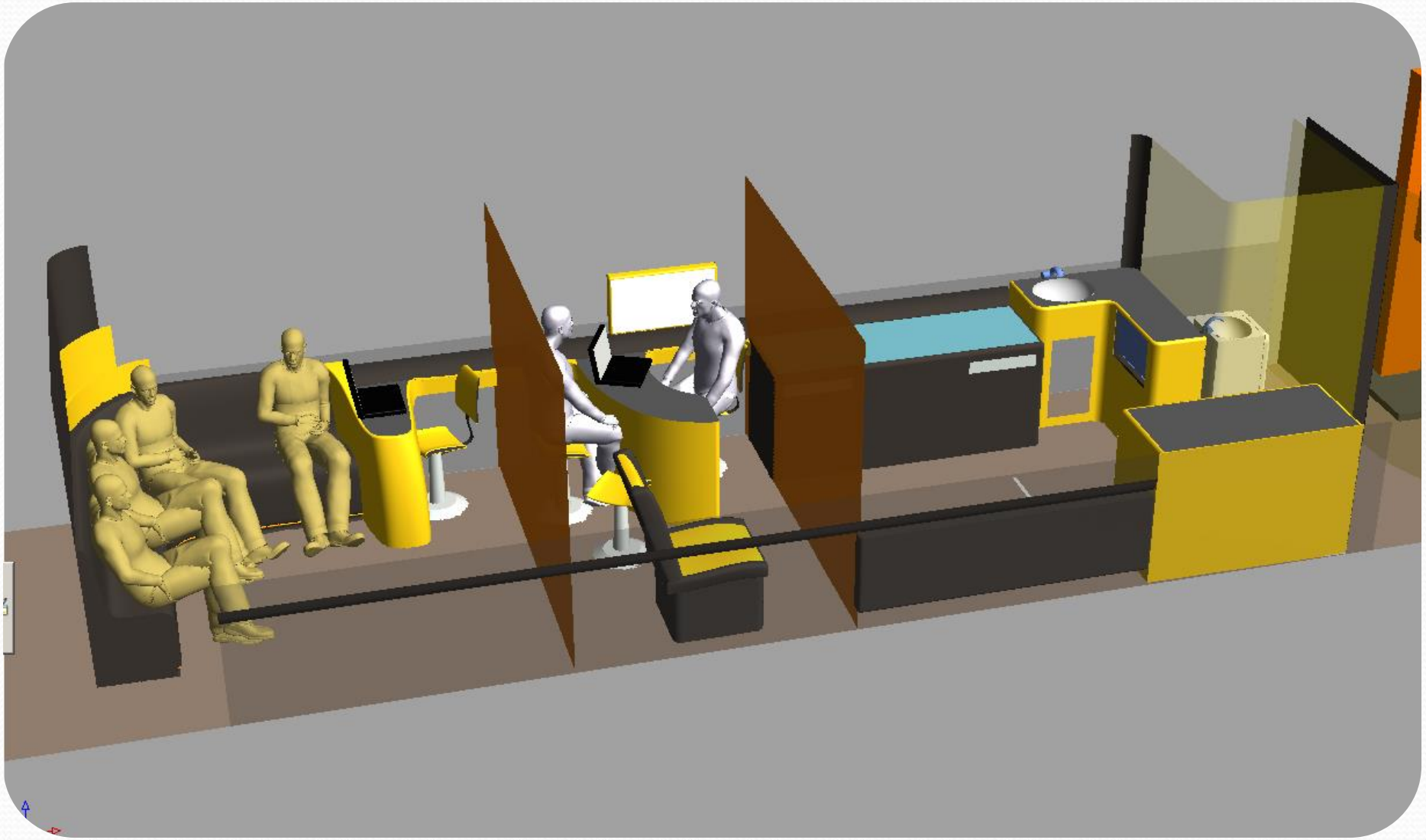


There is always a need for privacy when the doctor is talking to his patients so we have roof mounted curtains which come down from either sides of the doctor to create a private area.

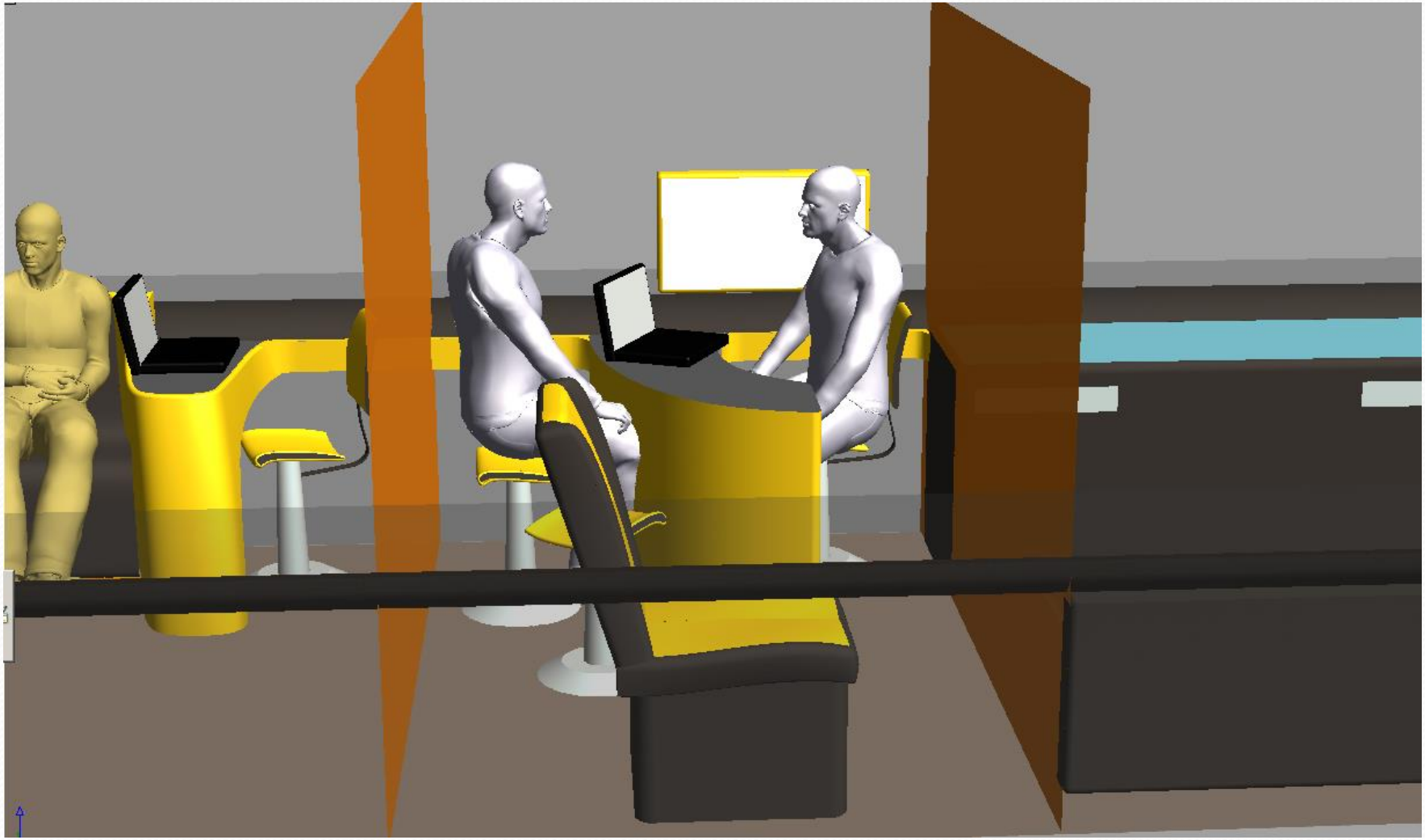
Privacy : Curtain 1 blocks visibility from lounge area



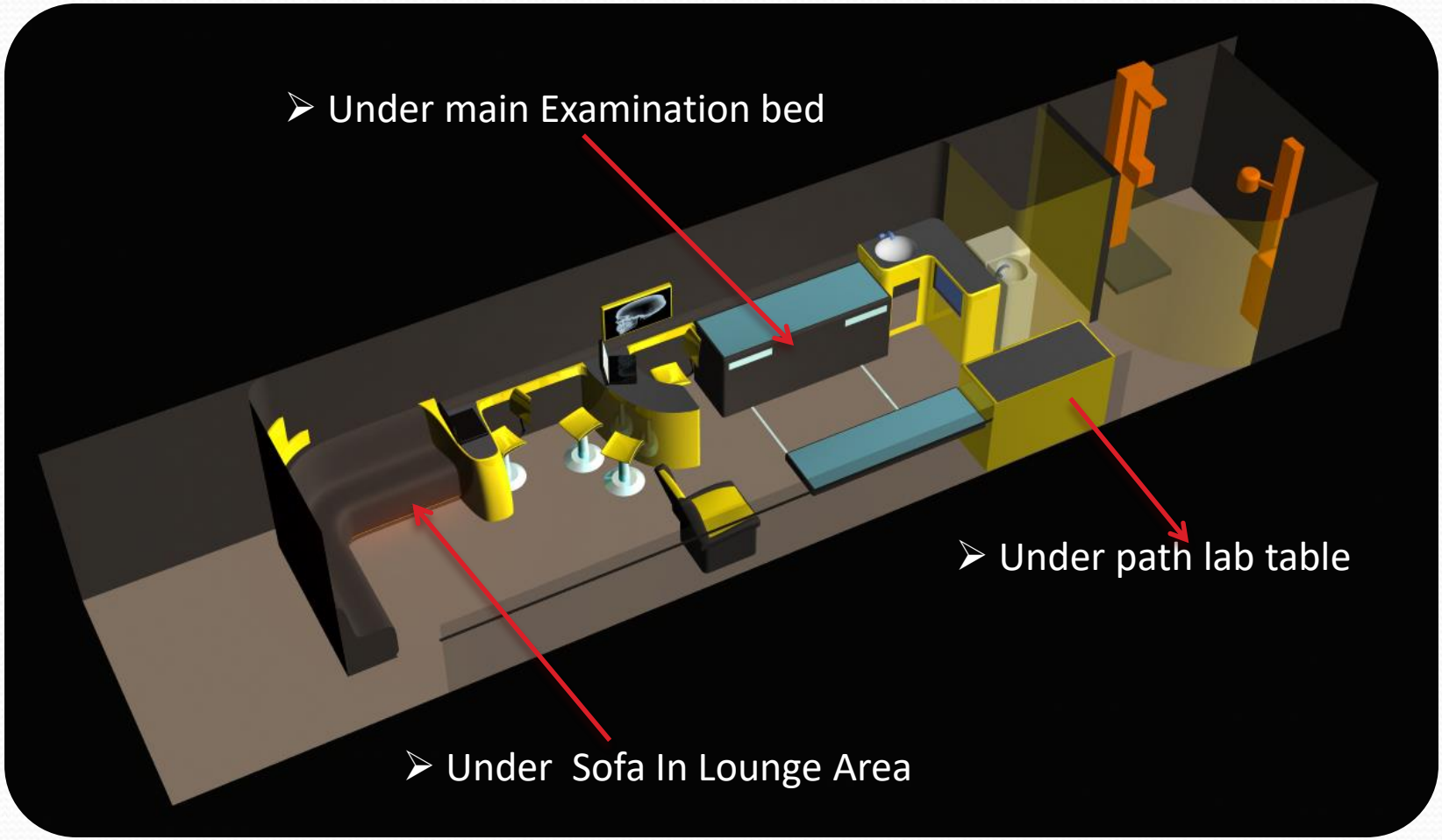
Privacy : Curtain 2 blocks visibility from the rear end



Privacy : when both curtains down it creates a private environment for discussions



Storage Areas : 3 main storage spaces

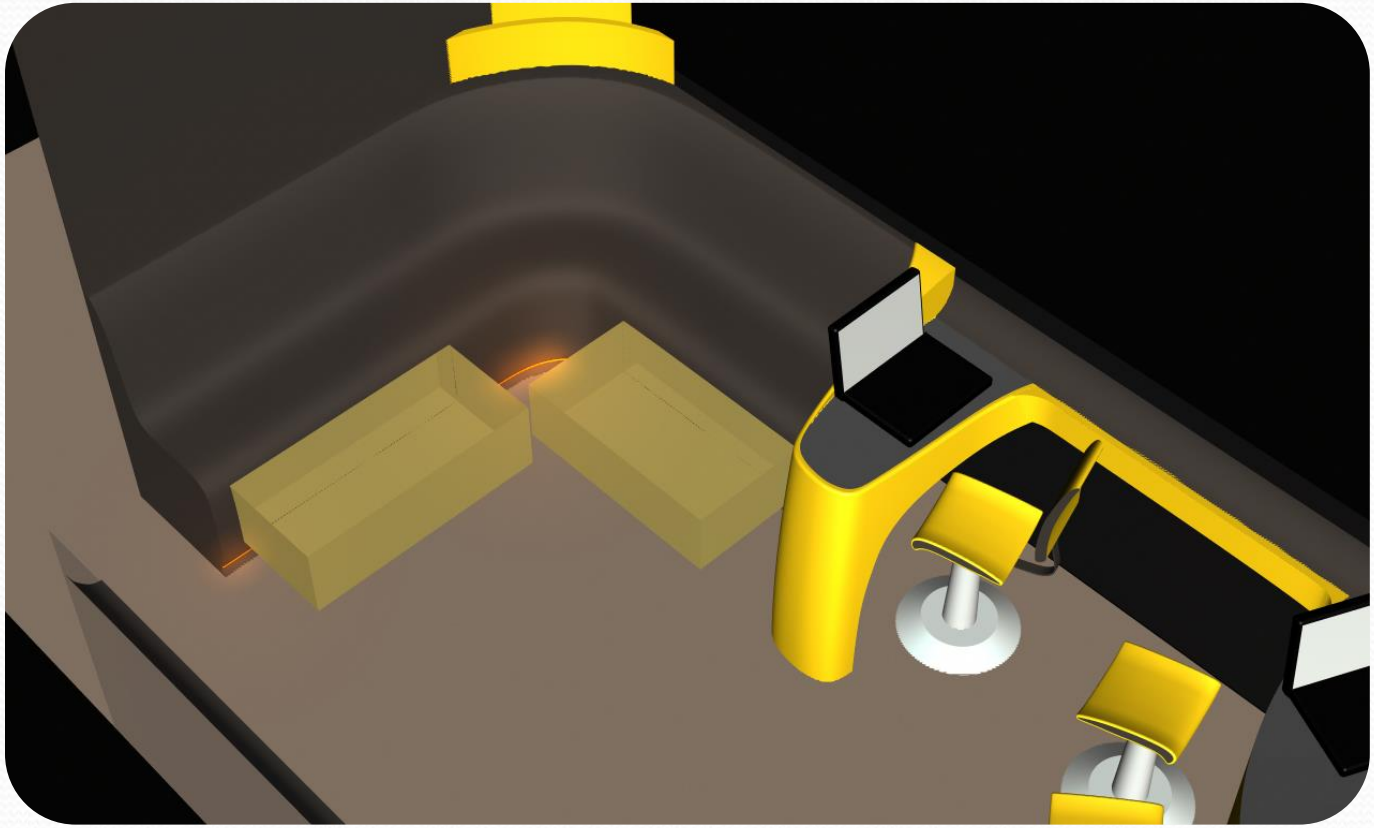


Under Sofa In Lounge Area

2 Drawers

Drawer size : Each

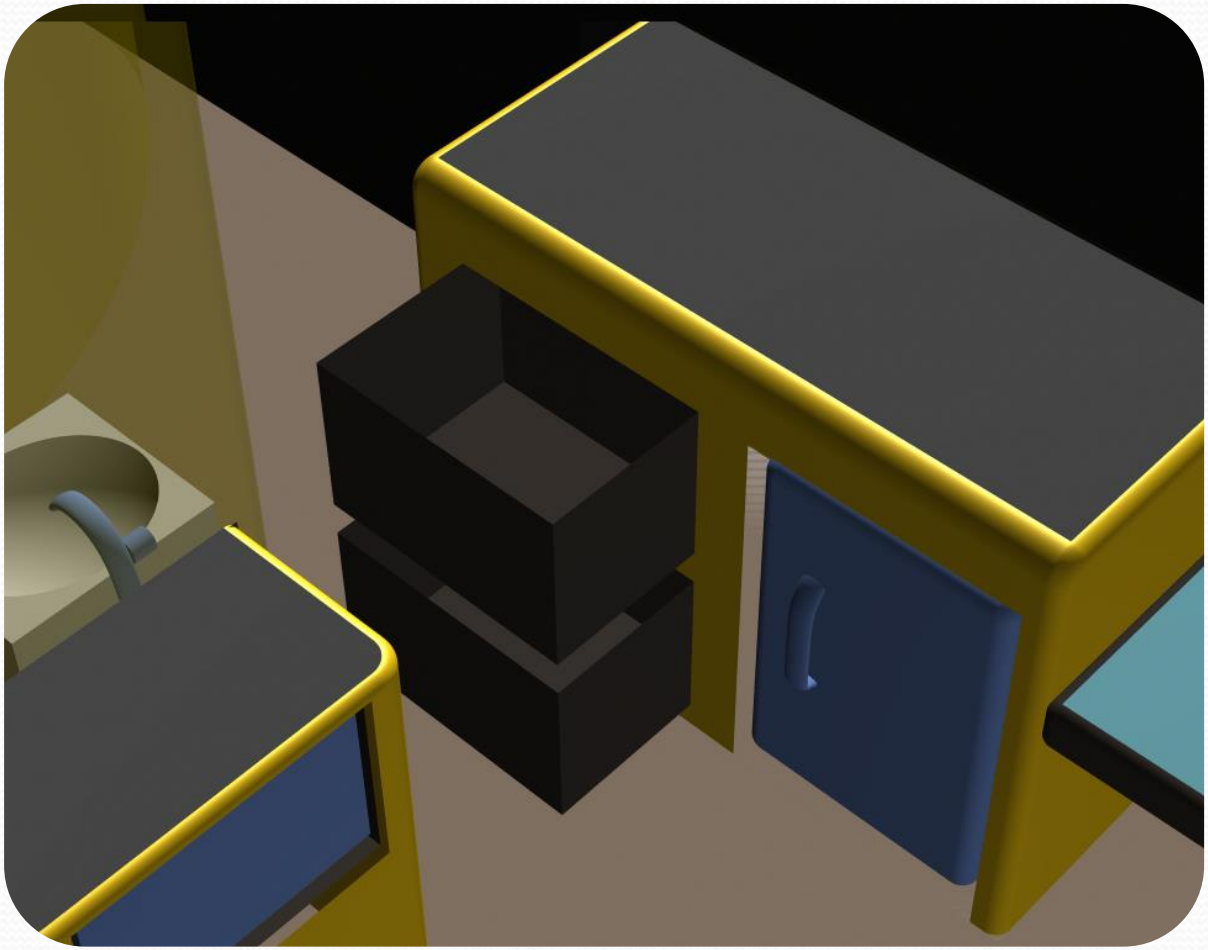
L x B x H = 750 x 400 x 220 mm



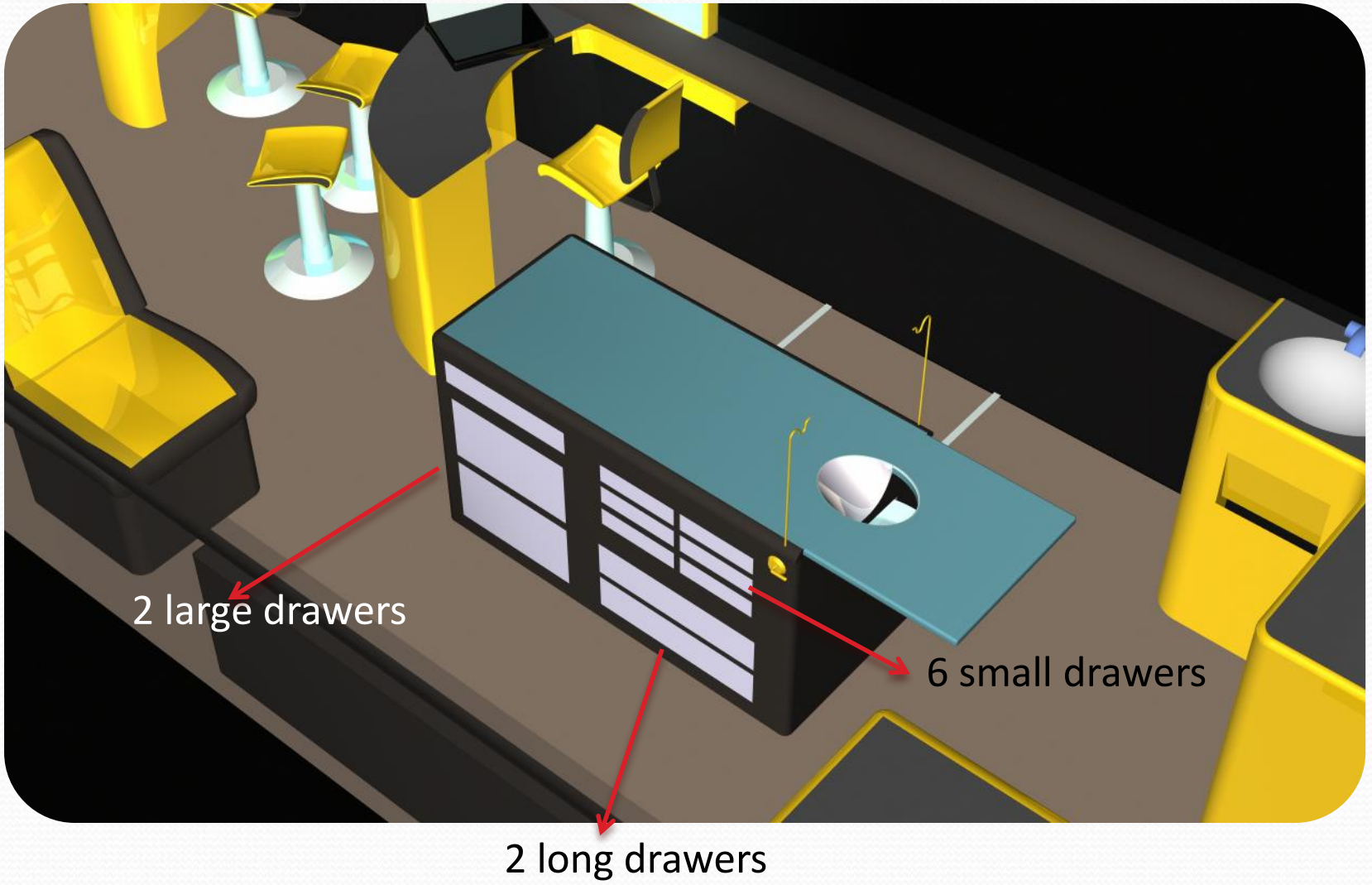
Under path lab table

2 Drawers
Drawer size : Each
L x B x H = 500 x 400 x 300 mm

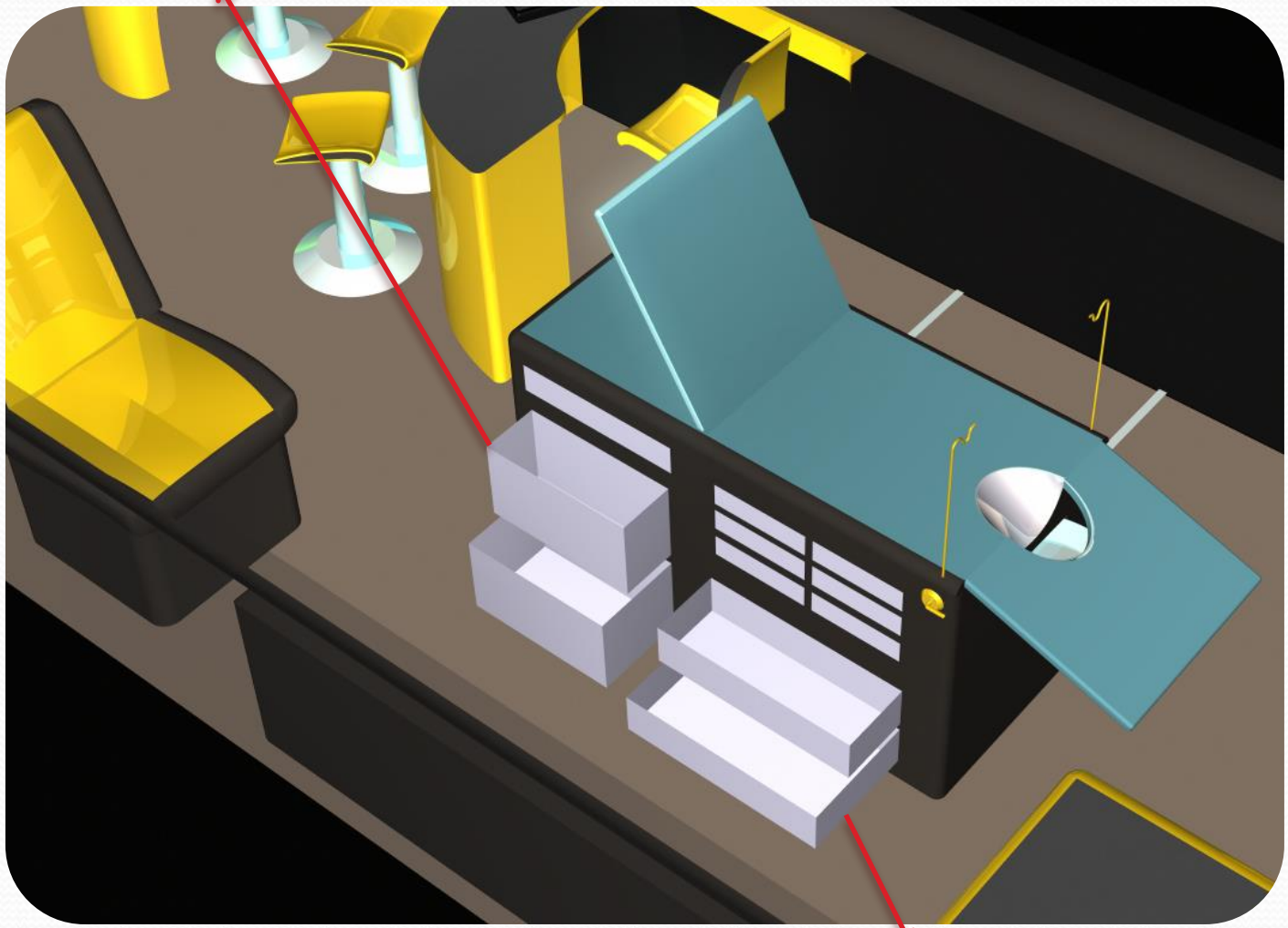
A small fridge
Basic space required
L x B x H = 500 x 500 x 700 mm



Under main examination bed:



2 drawers size : 430 x 350 x 220 mm each

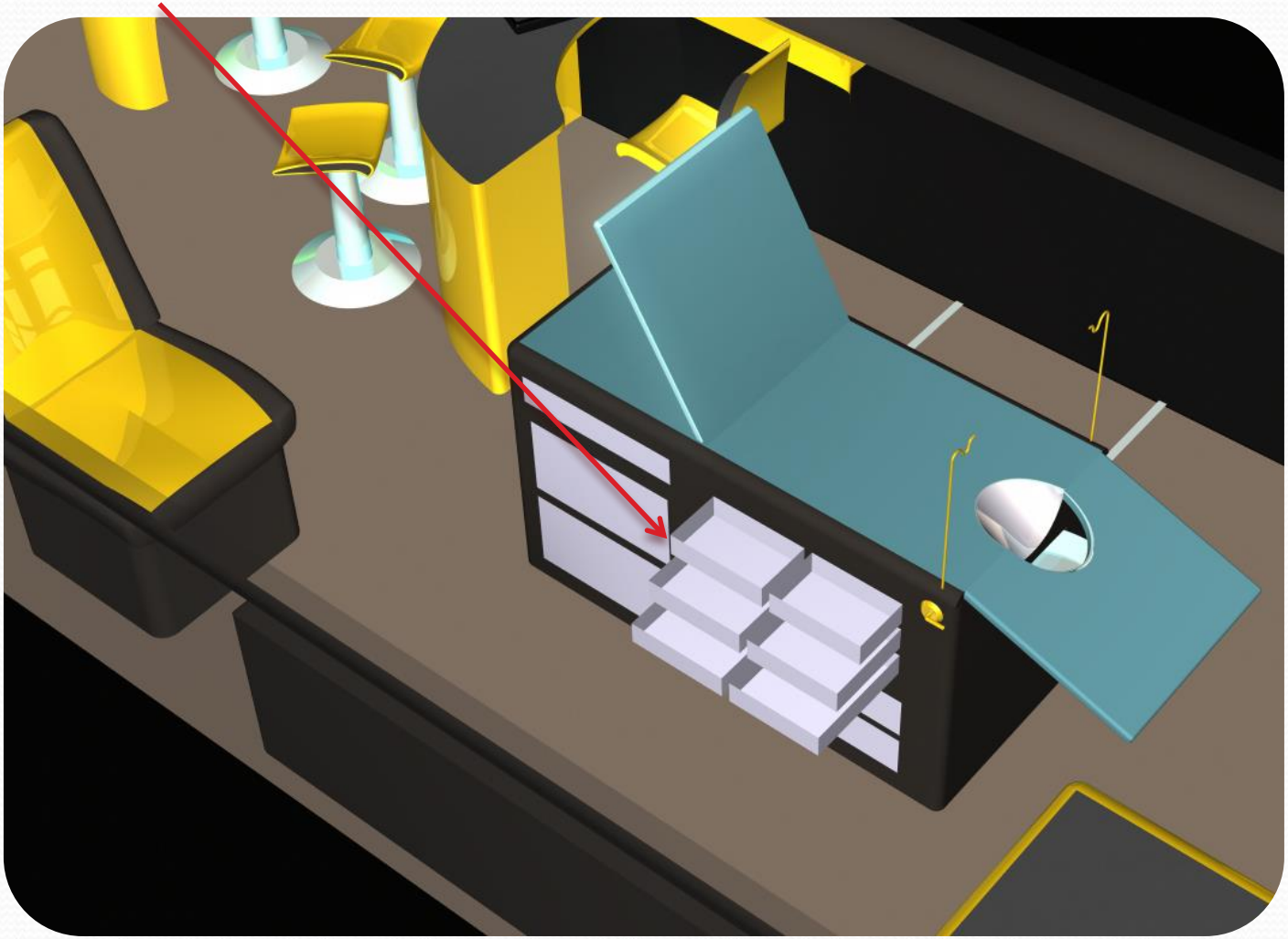


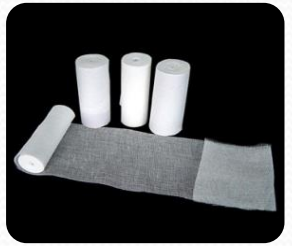
Storage

2 long drawers size : 550 x 350 x 70 mm each

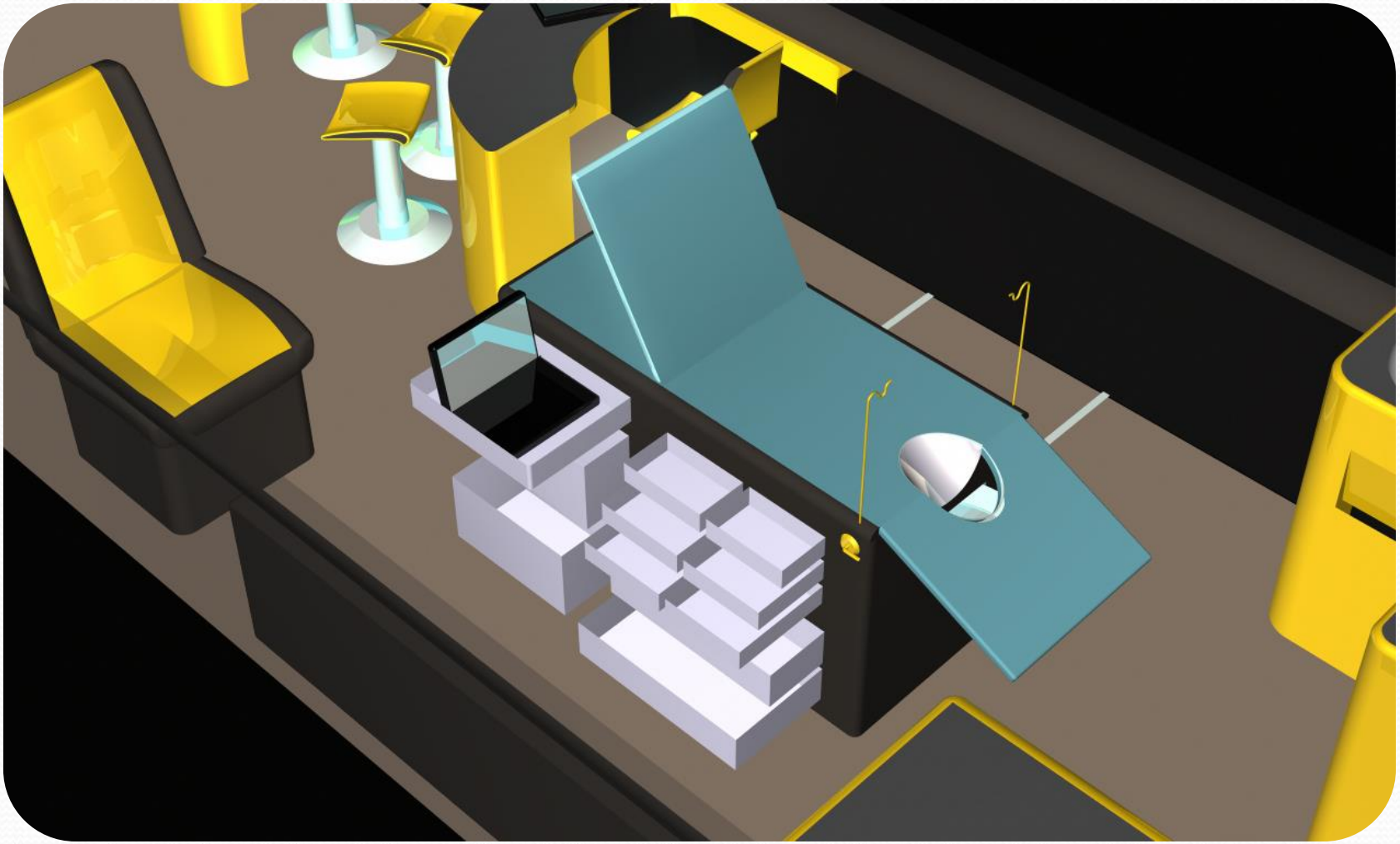
Storage

6 small drawers size : 250 x 350 x 70 mm each

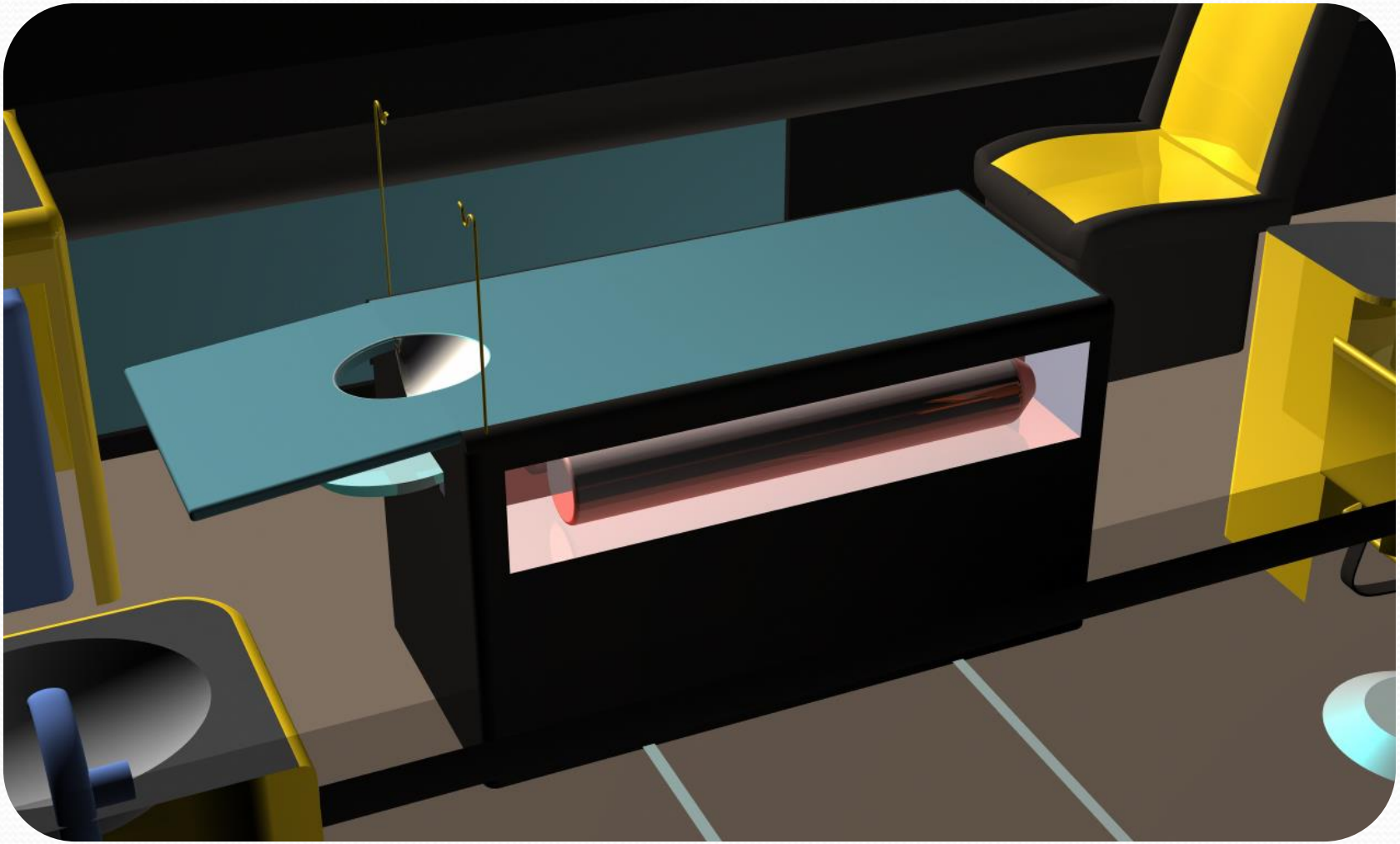




Under main examination bed –Total storage

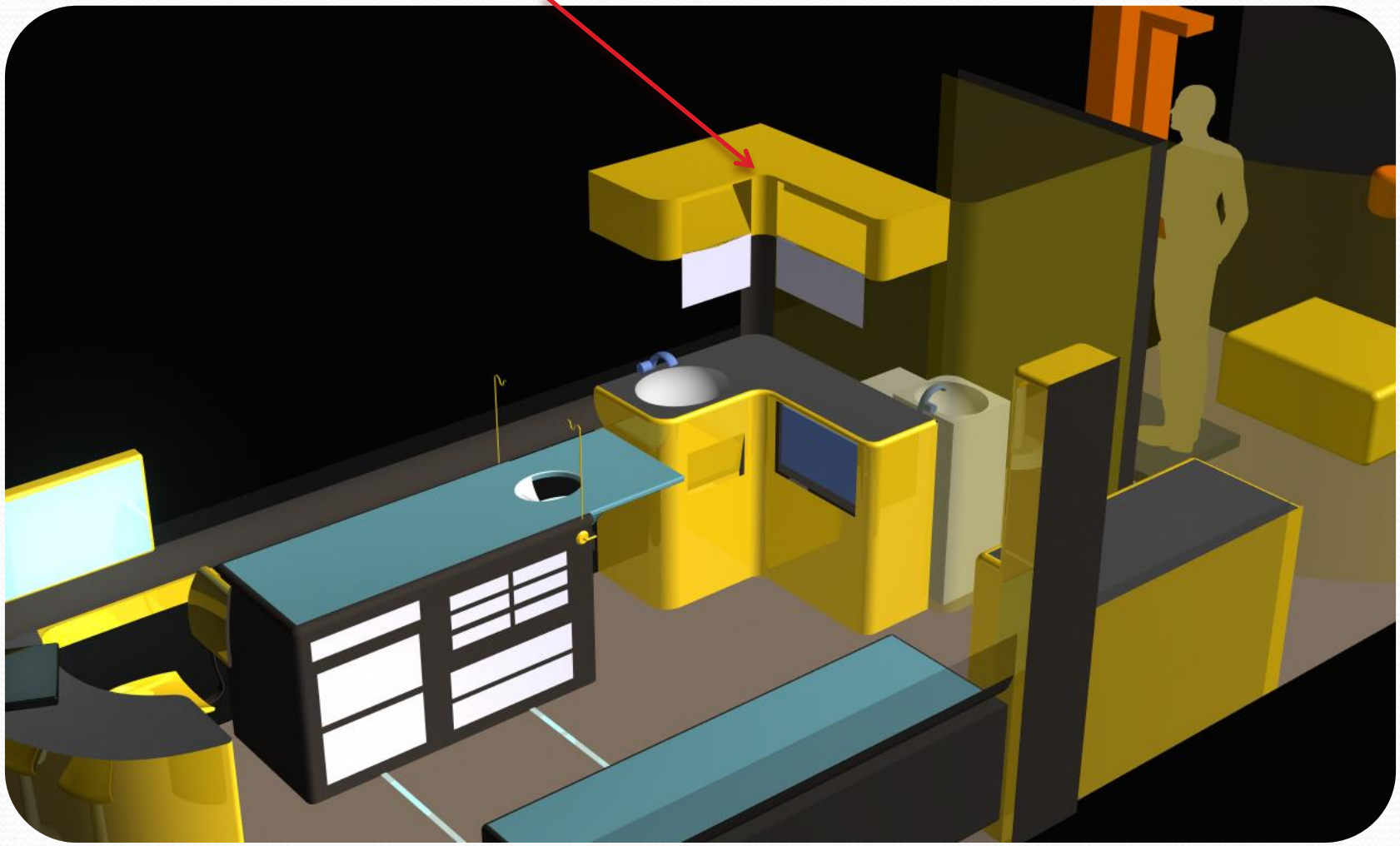


Oxygen Cylinder within the bed:



The cylinder is placed horizontally within the bed this helps in reducing the requirements extra supply pipes running around the bed if the cylinder was placed anywhere outside around the bed.
Oxygen cylinder size considered is 150 mm diameter and one meter length .

Storage above Pantry area :



Above the pantry area storage space available : 300 x 430 x 220 mm each

Side Awnings :

These provide a temporary shelter area.

Under these shelters we can arrange health check up camps on a large scale in rural areas.

People can sit under this shelter and watch the Programs which will be showed on the video screen.

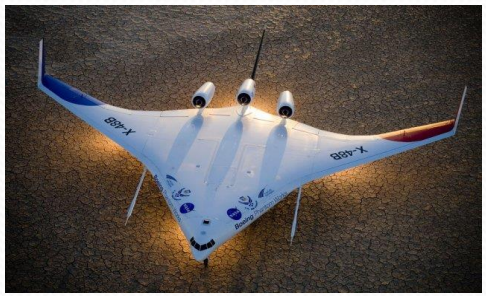
Side Awnings & Video Screen:

Side awnings are mounted on top of the bus and they fold out and rest on two supports. A projector screen is also mounted on the side of the bus which can be used to show Health awareness programs in villages etc.

3D Model: Alias Studio Tools

Exterior Styling : Image board

Sleek



Sleek

Dolphins

Futuristic

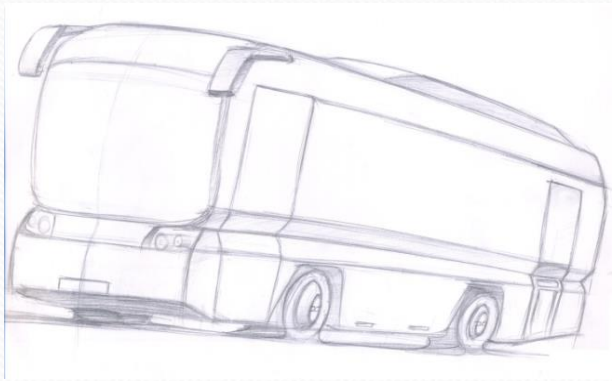
Red cross

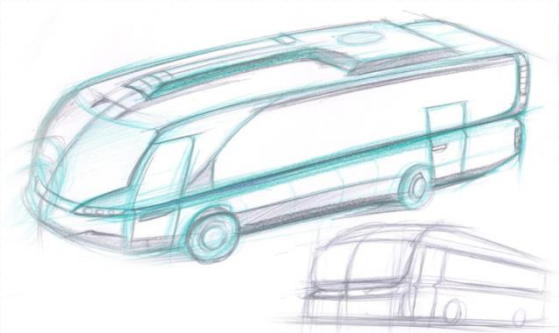
Dynamic

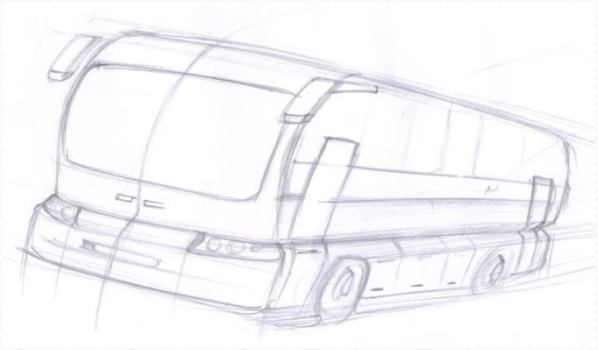
Care

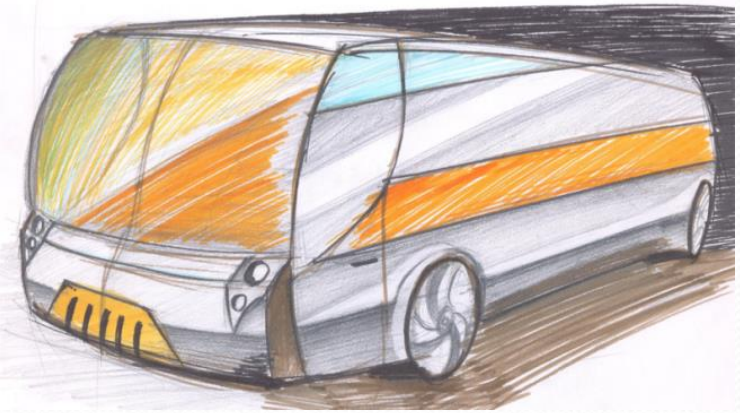
Continuity

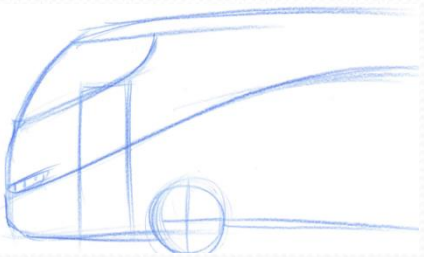
Ideation : Initial Sketches

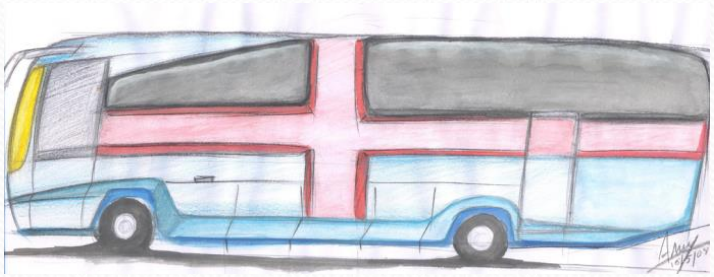


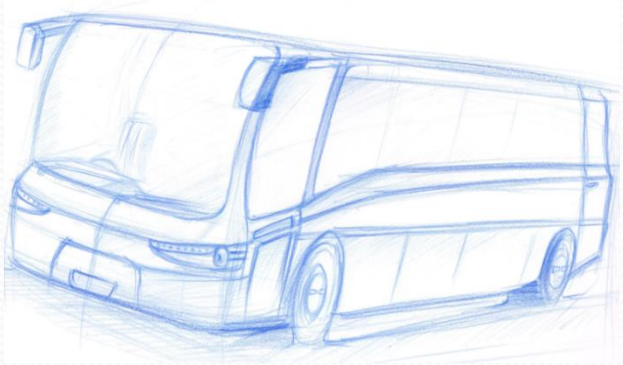




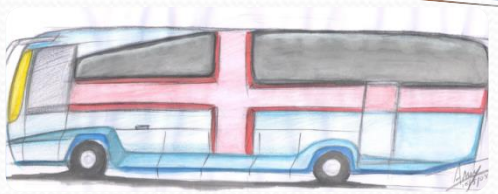


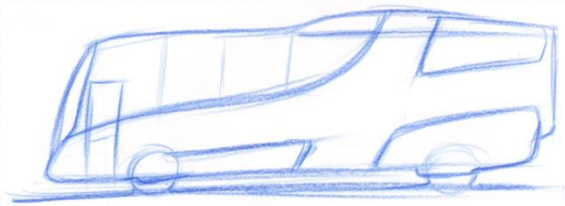
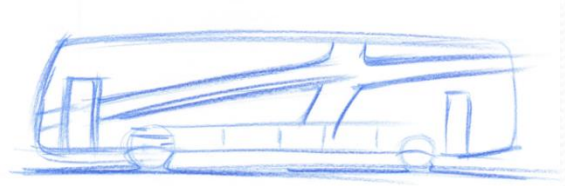
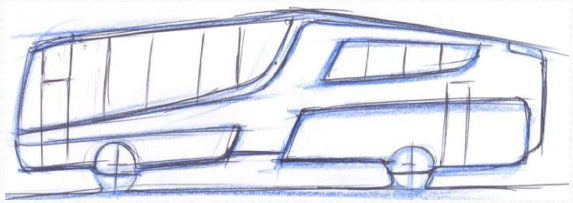
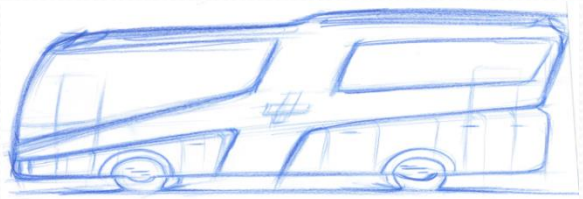
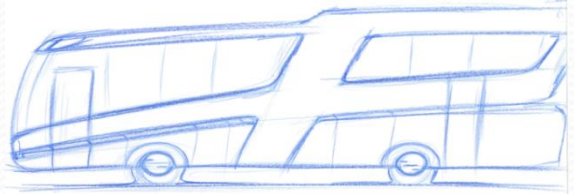
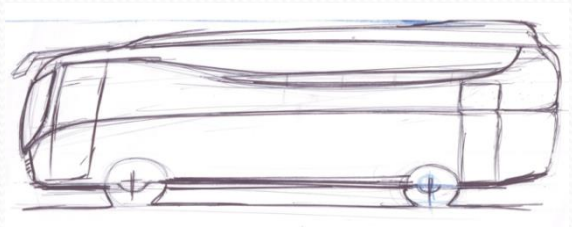
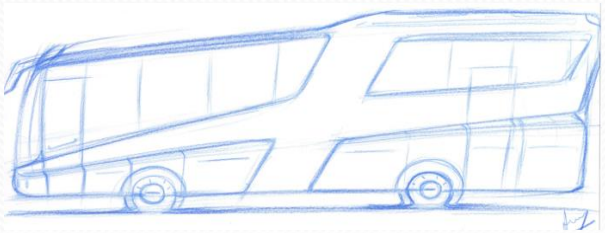
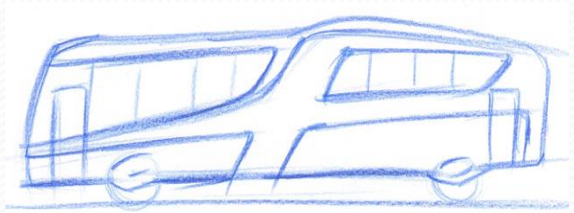
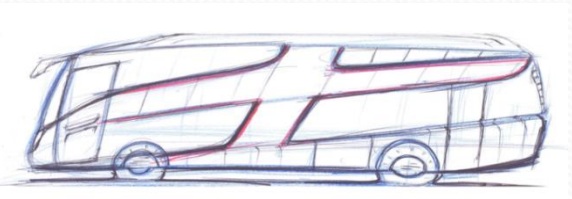
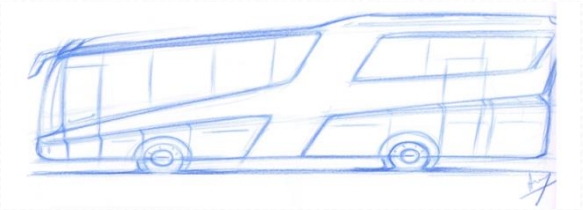




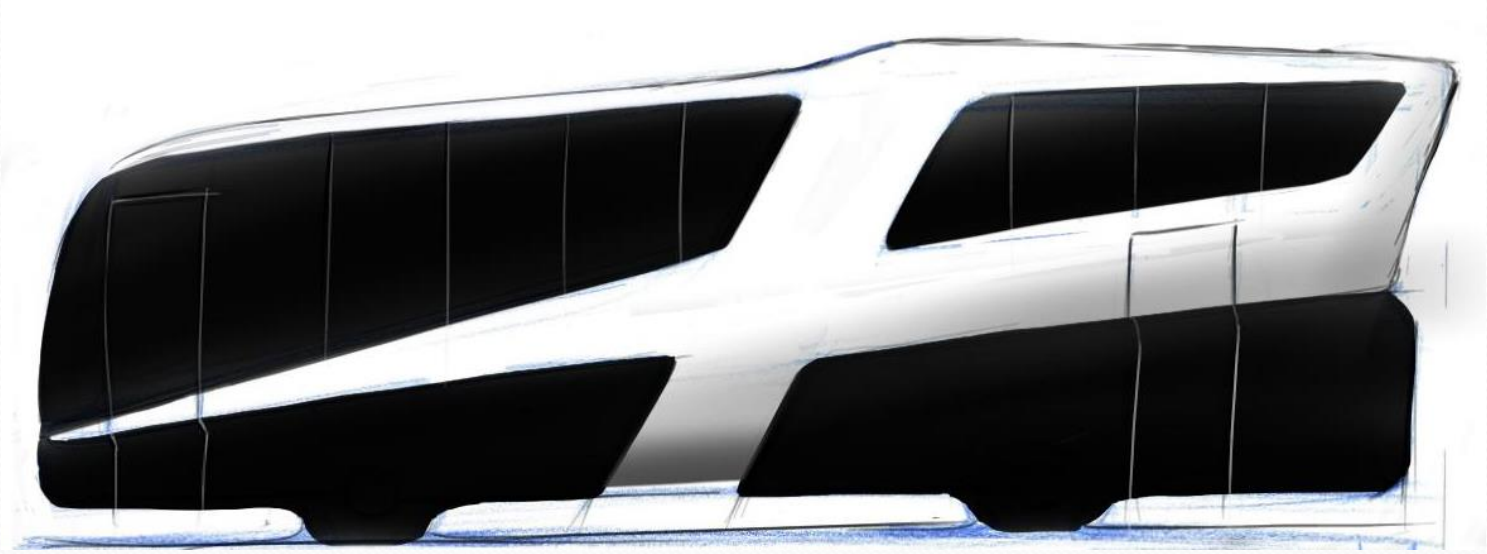


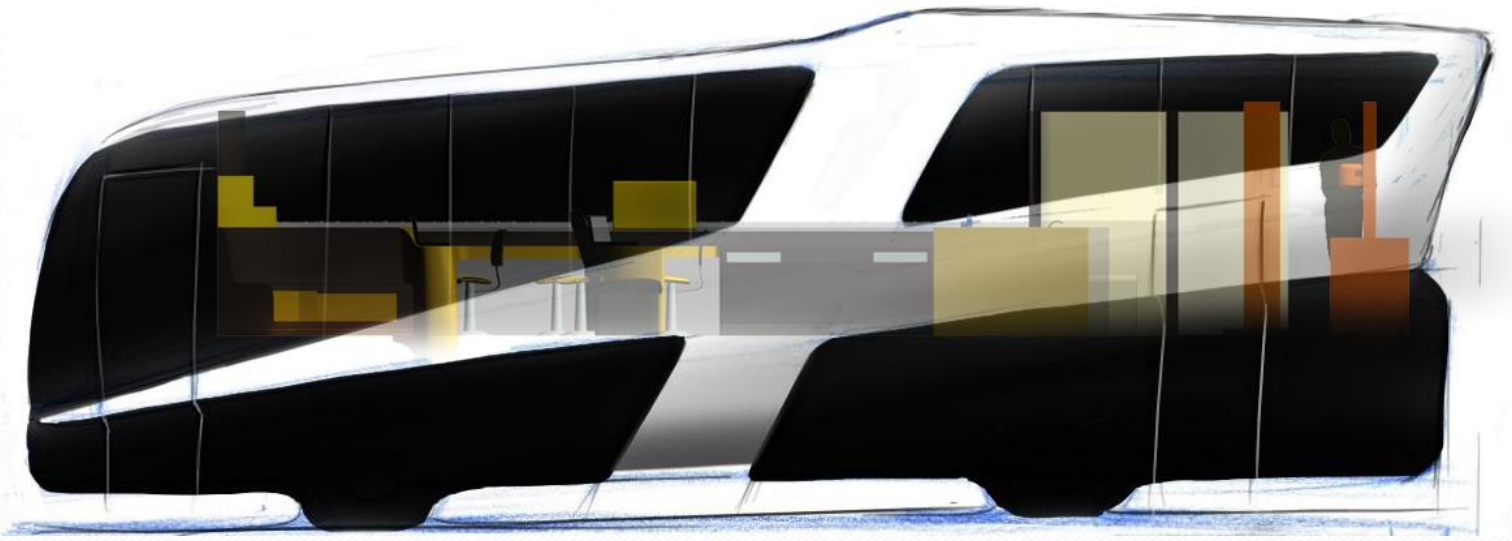
Concept refinements :



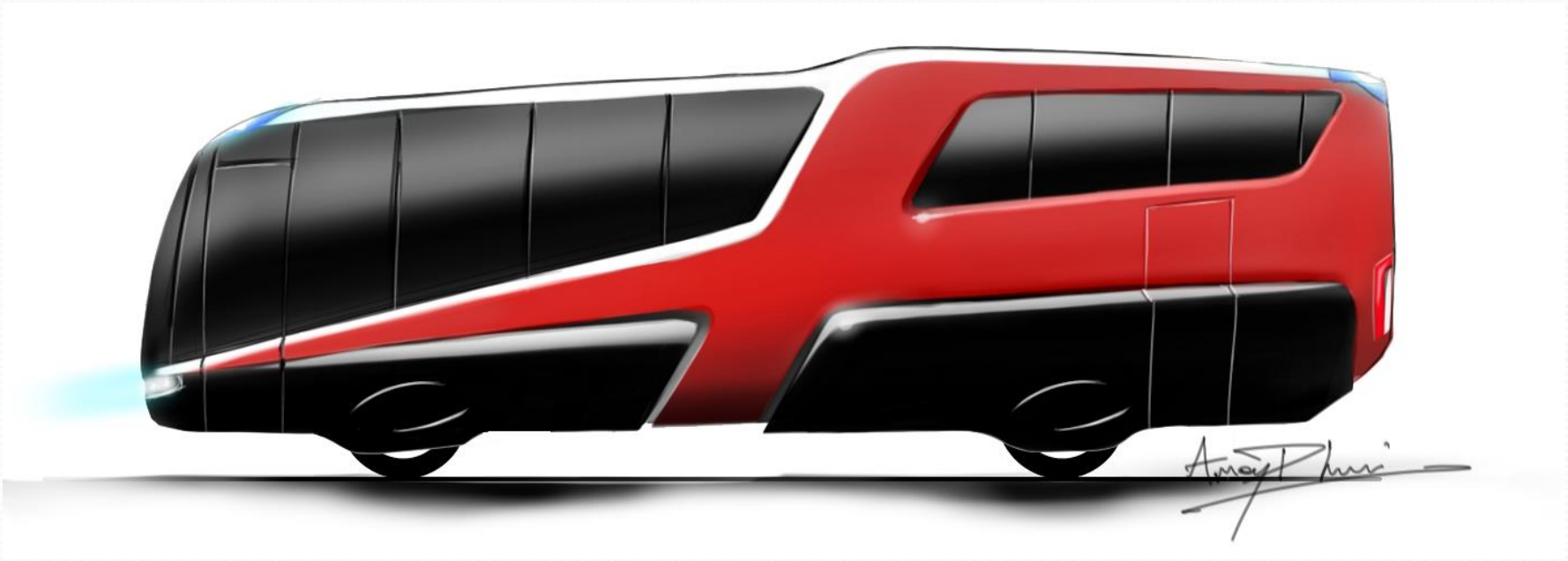












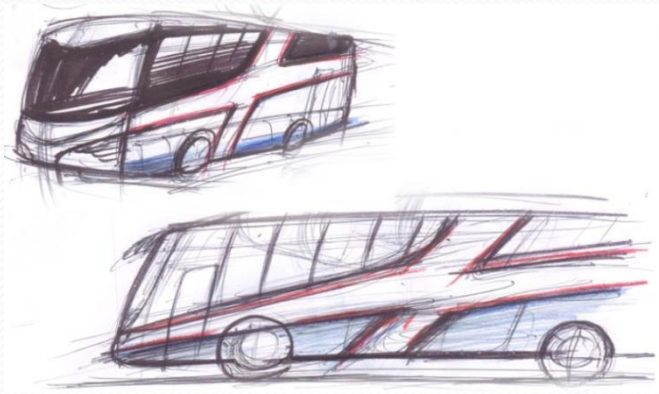

Concept refinements :

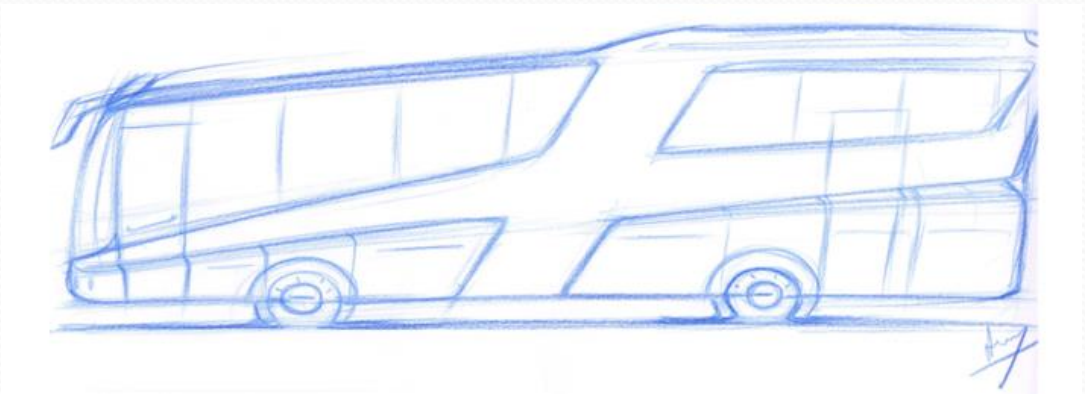




Final Concept rendering :







Thank You

Learning :

Being primarily interested in the field of transportation, This opportunity helped me In developing a deeper understanding of the basics of automotive design.

The company is One of its kind in India which allows its customers to have fully customized vehicles inside out.
The design process being followed is also self developed and is very unique in itself because The vehicles are fully hand built single units and watching such a process was very interesting.

During the one month spent in the company I got to gain a lot of technical know-how of manufacturing processes and structural understanding of vehicles.

Working with the experts in the field I learnt a lot. Interactions with the founder of company Mr.Dilip Chhabria were very knowledgeable. The company has a large strength 300 skillful workers who work day and night to make each vehicle by hand. Having a Look at the ongoing projects being executed right from the sketch stage to final model was very fascinating.