\section{Analysis of aircraft dimensions}

\subsection{Dimensions for the seats}

Here are the characteristic dimensions of the seats of an Embraer jet E175 in economy class:

\begin{figure}[h]

\centering

\includegraphics[width=7cm]{images/seat\_dimensions\_image\_global}

\caption{Seats of a typical Embraer E175 in economy class}

\label{fig:seat\_dimensions\_1}

\end{figure}

\begin{figure}[h]

\centering

\includegraphics[width=7cm]{images/seat\_dimensions\_image\_top&front\_view}

\caption{Characteristics of the seat}

\label{fig: seat\_dimensions\_2}

\end{figure}

\begin{figure}[h]

\centering

\includegraphics[width=7cm]{images/seat\_dimensions\_table}

\caption{Table presenting all the dimensions that define an airplane seat}

\label{fig: seat\_dimensions\_table}

\end{figure}

\subsection{Dimensions of the fuselage}

In order to determine what are the constraints of our design space we wanted to have a precise map of the aircraft fuselage and its available space for passengers. Here are the characteristic dimensions of the fuselage of an Embraer jet E175.

\begin{figure}[h]

\centering

\includegraphics[width=7cm]{images/fuselage\_dimensions}

\caption{Characteristic dimensions of the fuselage of an Embraer jet E175}

\label{fig: fuselage\_dimensions}

\end{figure}

\begin{figure}[h]

\centering

\includegraphics[width=7cm]{images/fuselage\_table}

\caption{Table presenting all the dimensions of the fuselage of an Embraer jet E175}

\label{fig: fuselage\_table}

\end{figure}

During dark horse mission we tried to design a new cabin layout for the boarding process, but then realized that it was impossible to widen the aisle to enable people to enter the plane with their own wheelchair. The fuselage space is so small and has so many constraints that it is very hard to change the actual configuration of seats and aisle.

\subsection{Dimensions of the luggage compartment inside the cabin}

To take advantage of the available space inside the cabin our team wanted to analyze the volume and the space dedicated to carry-on luggage. All the dimensions of the luggage compartment are represented on \ref{fuselage\_table} and their values are presented in \ref{luggage\_compartment\_table}.

\begin{figure}[h]

\centering

\includegraphics[width=7cm]{images/luggage\_compartment\_table}

\caption{Table presenting all the dimensions of the fuselage of an Embraer jet E175}

\label{fig: luggage\_compartment\_table}

\end{figure}

From the previous analysis we noticed that only 52% of the luggage compartment is actually dedicated to carry-on storage. This is because the remaining 48% are dedicated to wires, light and air conditioned systems.