

Curso de Engenharia de Sistemas

Systems Engineering Bachelor of Science Program

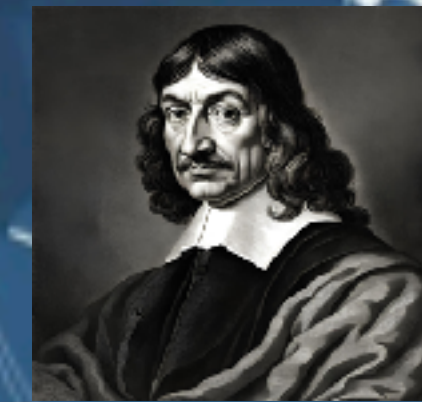
Essence of the
universe

"The whole is greater
than the sum of its parts."

-Aristotle

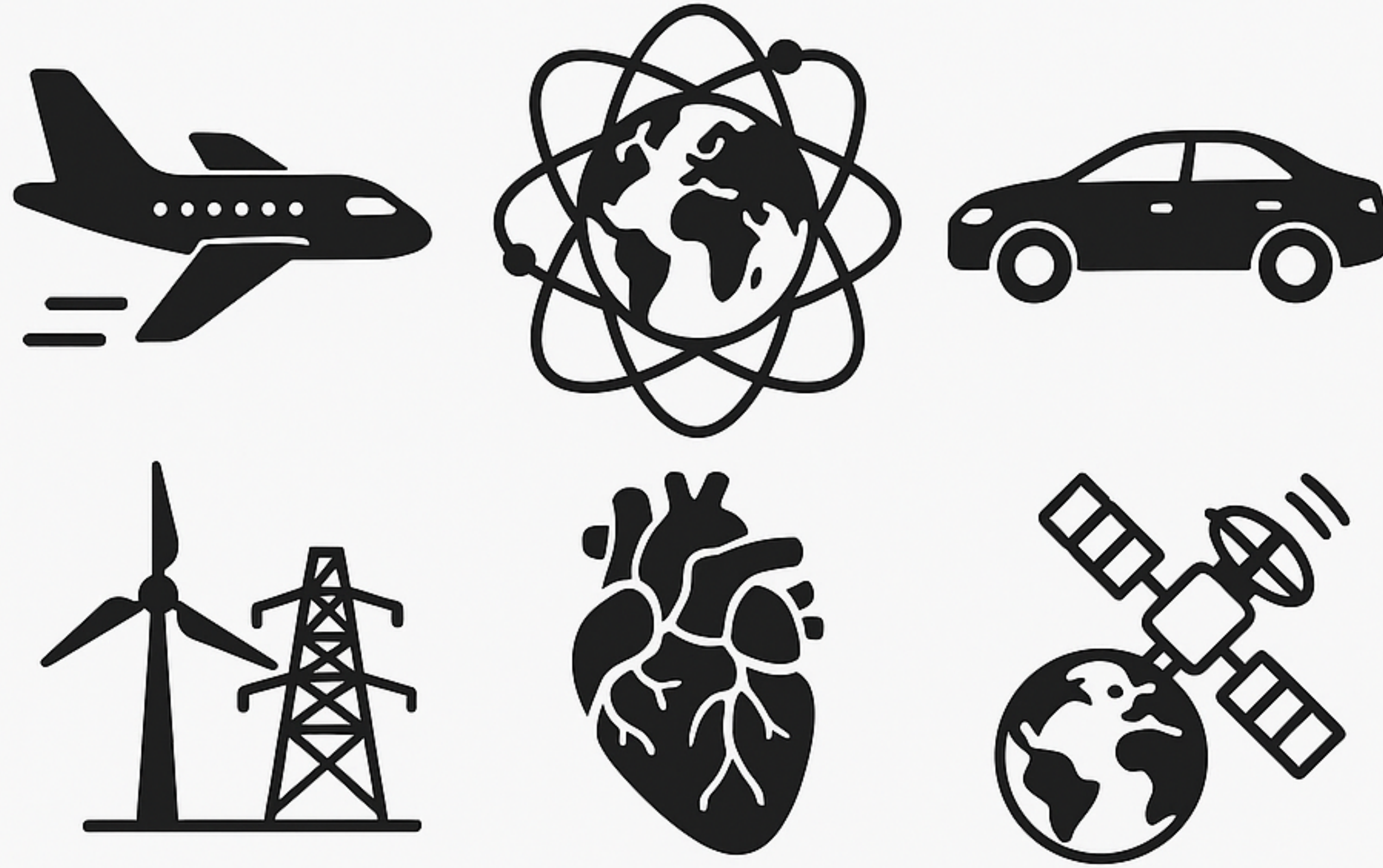


Reductionism



Cybernetics
Digital Twins



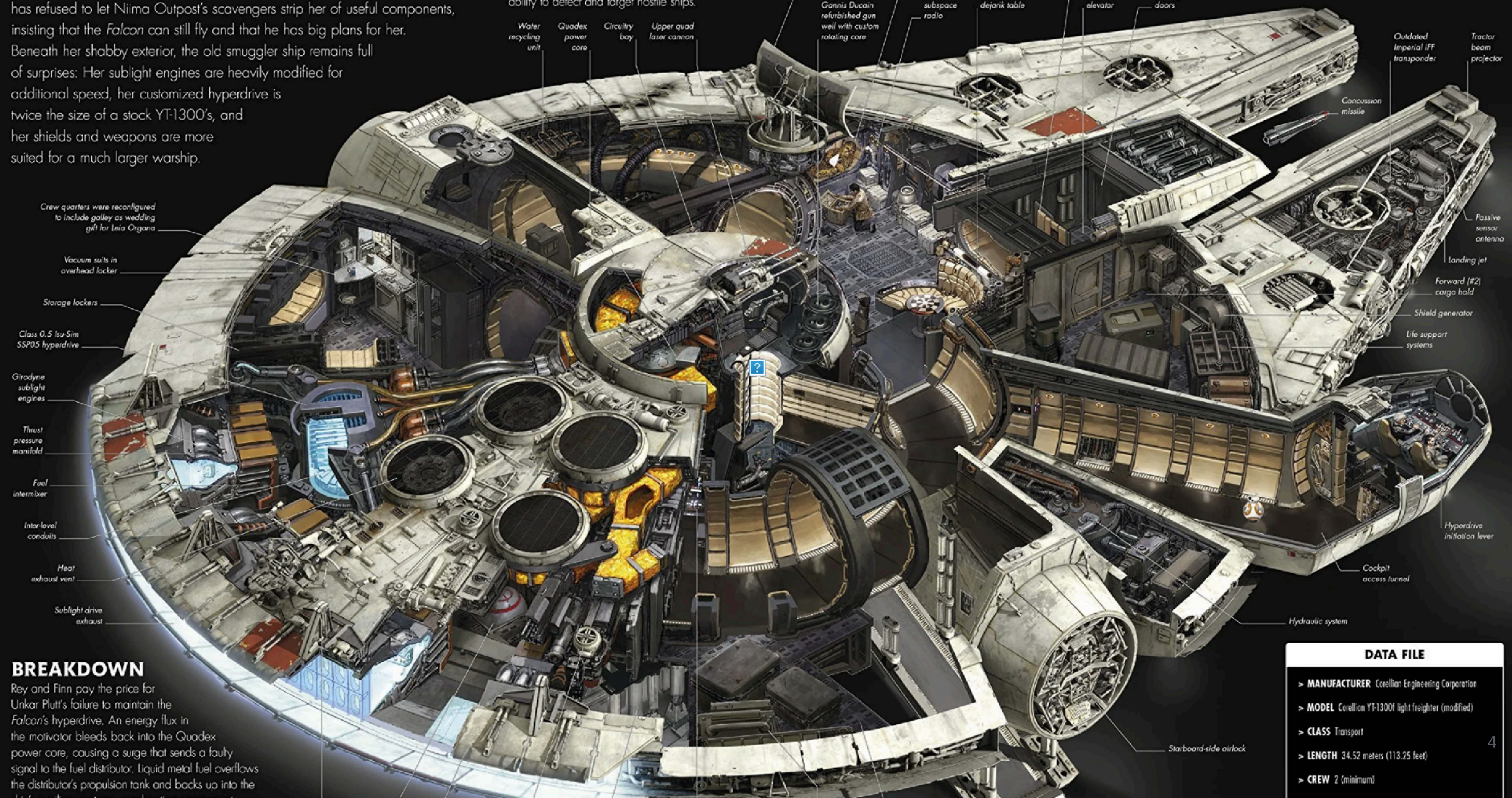


SYSTEMS

ONCE FAMOUS AS one of the galaxy's fastest starships, the *Millennium Falcon* has fallen on hard times, languishing beneath a tarp in Jakku's dilapidated spaceport. Unkar Plutt won't say how he acquired the battered freighter and has refused to let Niima Outpost's scavengers strip her of useful components, insisting that the *Falcon* can still fly and that he has big plans for her. Beneath her shabby exterior, the old smuggler ship remains full of surprises: Her sublight engines are heavily modified for additional speed, her customized hyperdrive is twice the size of a stock YT-1300's, and her shields and weapons are more suited for a much larger warship.

strapped on during the Battle of Endor and has been replaced with a civilian model Corellian Engineering Corporation sensor dish, degrading the freighter's ability to detect and target hostile ships.

recall her engine as an intermediate pushing containers in orbital freight yards. But as with many YT-1300s, an enterprising captain saw that her powerful engines and modular construction made her ideal for carrying cargoes of dubious legality.

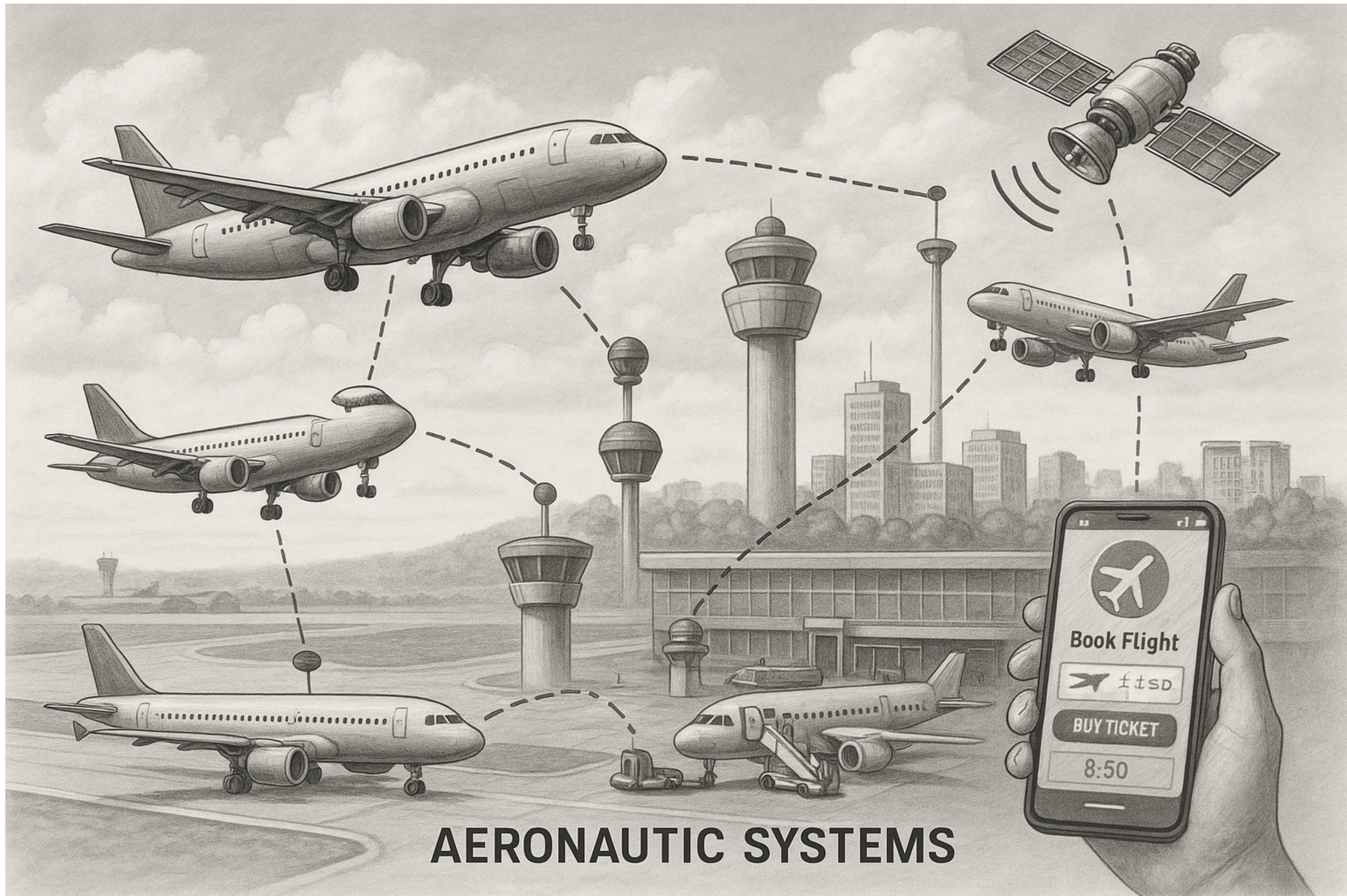


BREAKDOWN

Rey and Finn pay the price for Unkar Plutt's failure to maintain the *Falcon*'s hyperdrive. An energy flux in the motivator bleeds back into the Quadex power core, causing a surge that sends a faulty signal to the fuel distributor. Liquid metal fuel overflows the distributor's propulsion tank and backs up into the ship's auxiliary systems, overheating components

DATA FILE	
> MANUFACTURER	Corellian Engineering Corporation
> MODEL	Corellian YT-1300f light freighter (modified)
> CLASS	Transport
> LENGTH	34.52 meters (113.25 feet)
> CREW	2 (minimum)
> WEAPONS	2 CEC AG-2G quad laser cannons



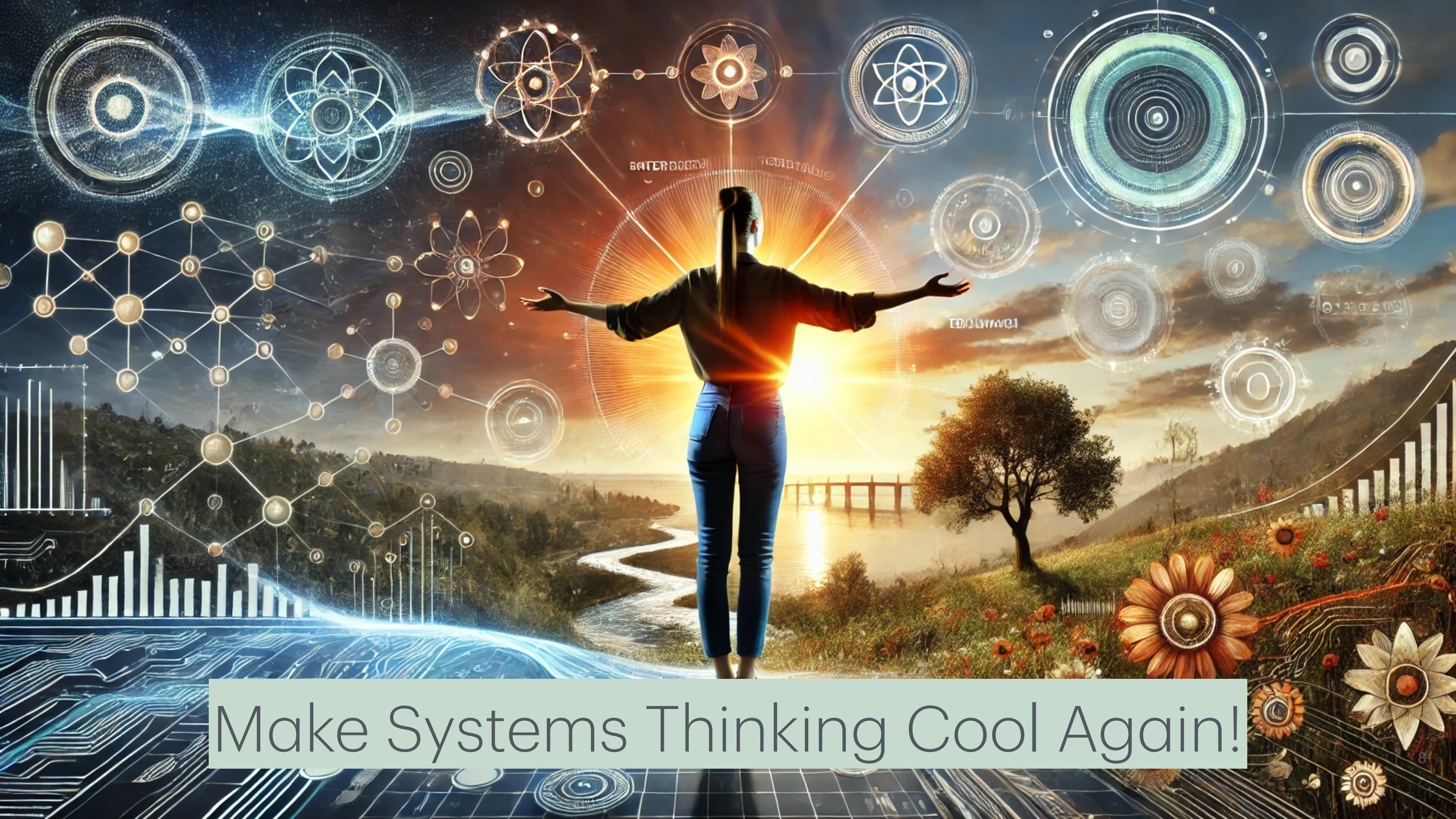


AERONAUTIC SYSTEMS



11/abr/23

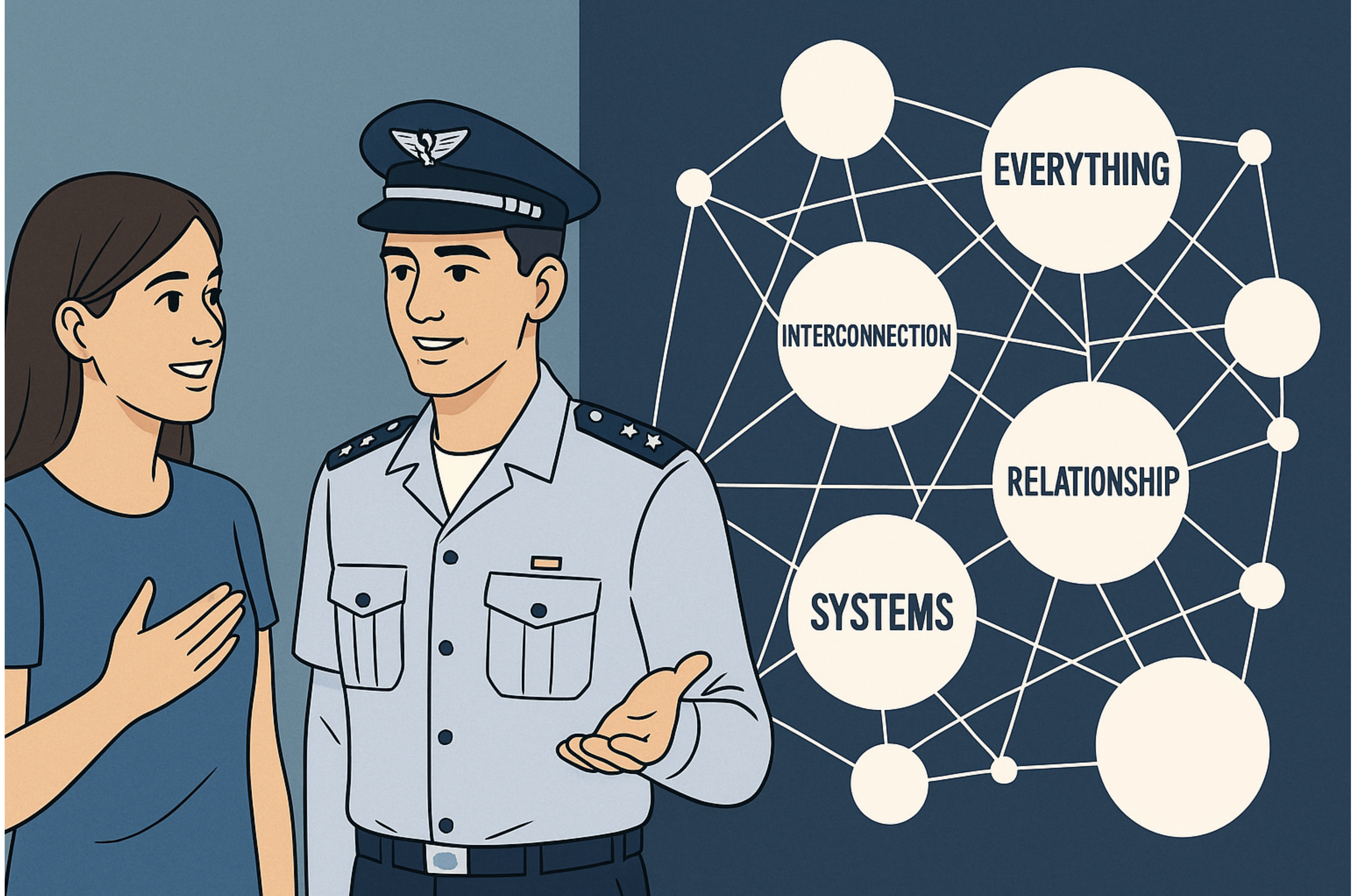
<https://futuretransport-news.com/panynj-and-nasa-partner-to-explore-future-of-urban-air-mobility/>



Make Systems Thinking Cool Again!

Proposta do ITA





BELL LABORATORIES

RECORD

VOLUME XXXI NUMBER 1 JANUARY 1953

Systems Engineering in Bell Telephone Laboratories

G. W. GILMAN
Director of Systems Engineering

The unprecedented demand for toll telephone service following World War II was not limited to communication between the larger cities but extended to the less densely settled areas served largely by open-wire facilities. Much of the new demand was for short haul toll service involving distances as short as twenty miles. The companies could, of course, string more wire, build completely new open wire lines or install cable, but this would involve large outlay of capital and use scarce material such as copper and lead.

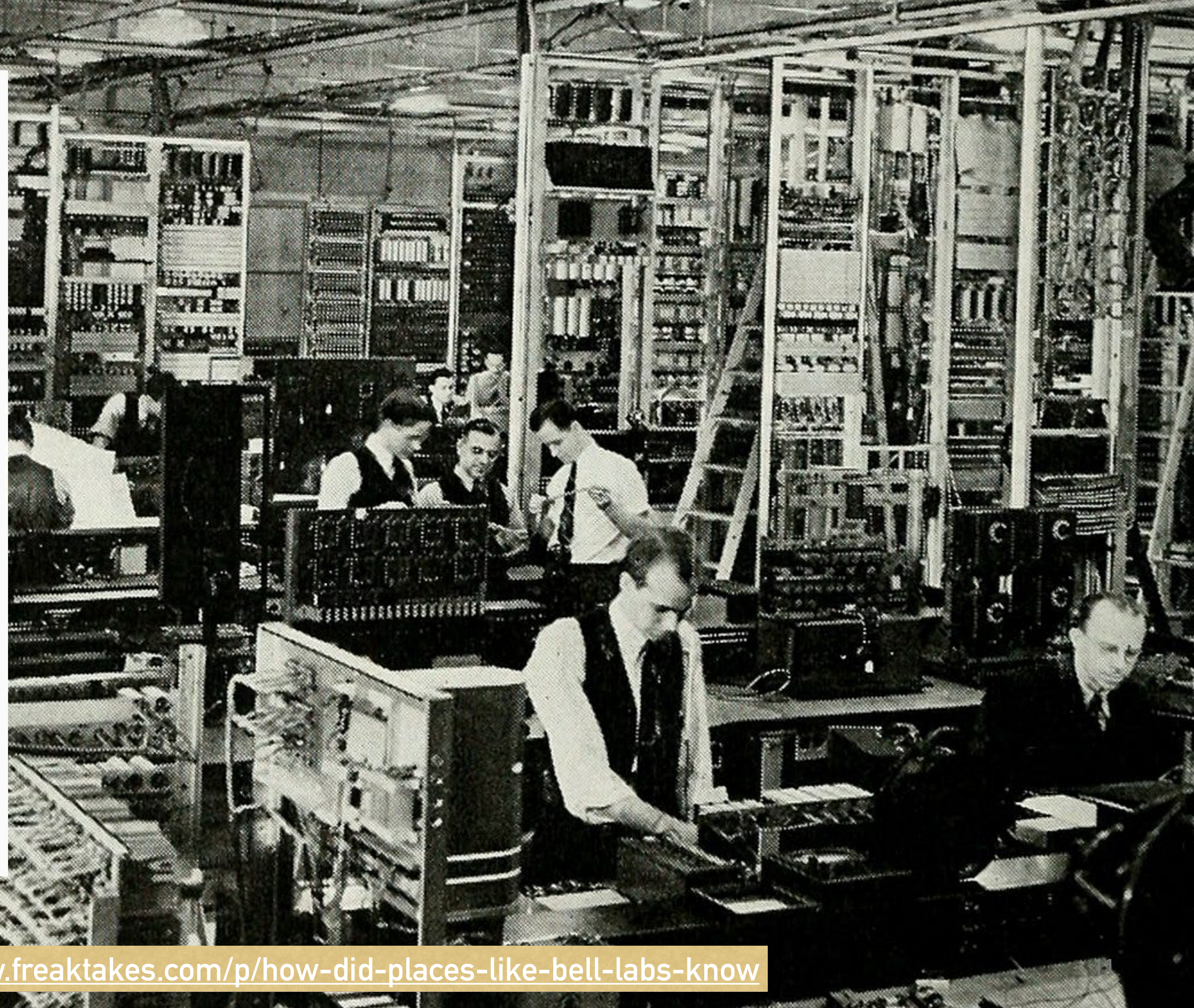
Another approach would be to add carrier systems, which make it possible for many conversations to share a pair of wires. However, to prove in, carrier systems must cost less than stringing new wire or building new pole lines. The available carrier systems proved in easily for the longer haul circuits but not for circuit lengths measured in tens of miles. Moreover, on many lines carrier had already been applied so extensively for the longer hauls that adding more channels would mean going to higher frequencies and thus introduce serious crosstalk problems. The question then was: Could

a new carrier system be designed which would be low enough in cost to be economical for distances as short as twenty miles and which could be operated on the existing open wire lines without expensive rearrangement of the wires?

Analyzing comparative costs and current advances in the technological art, Laboratories systems engineers predicted that the job could be done. On paper they broadly outlined what such equipment would have to consist of, how it would have to perform transmission-wise and how little it would have to cost. Then, as actual development of the system was begun, they worked closely with the specialists who would develop the equipment and the many apparatus components involved, specifying in more detail what the system would have to accomplish in cost and performance. At the same time, they conducted detailed studies of crosstalk and other transmission properties of the open wire lines. Thus, the teamed efforts of systems engineers and development specialists produced the new Type-O carrier system, which puts up to sixteen voice circuits on a single open wire pair and

January, 1953

1



1950

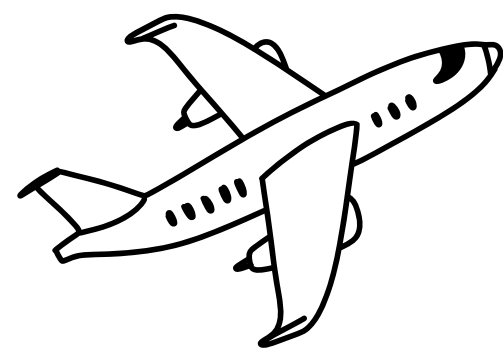
2010

2020

2030



Aeronáutica



Mecânica
Eletrônica

Aeroespacial



Computação

Infraestrutura

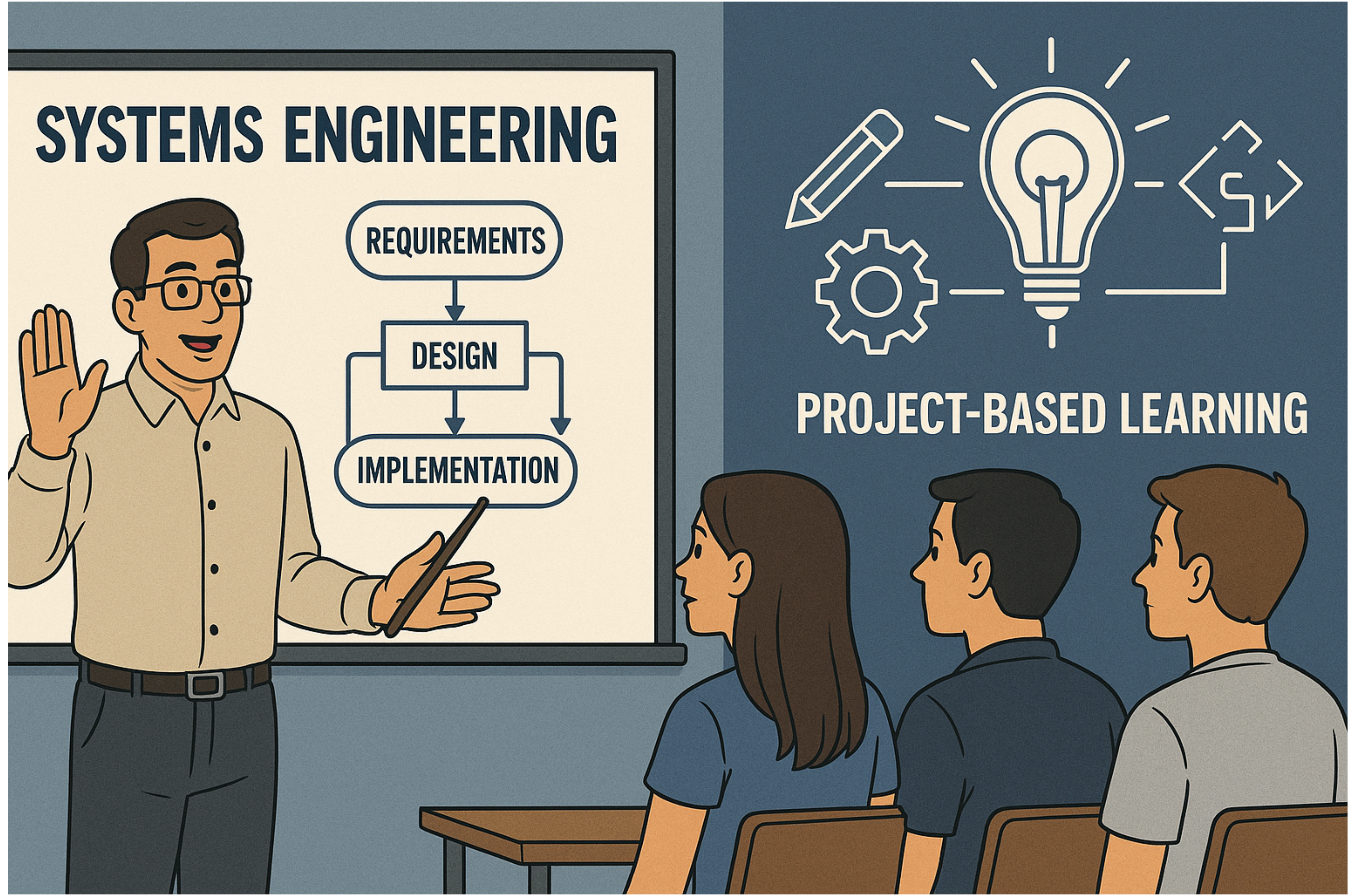


GEORGE W. GILMAN

Sistemas
Energia

BioEng





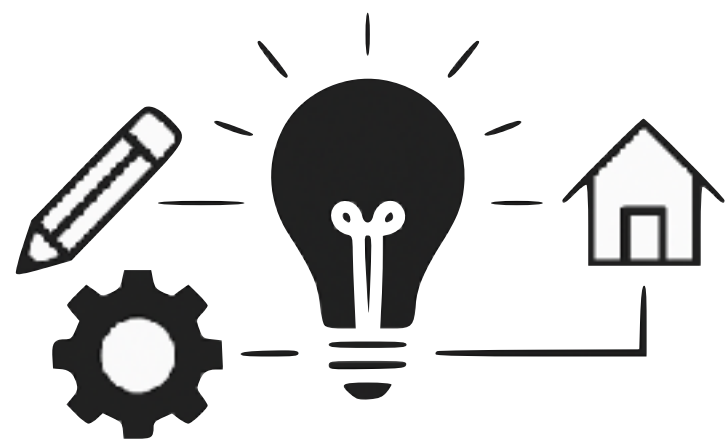
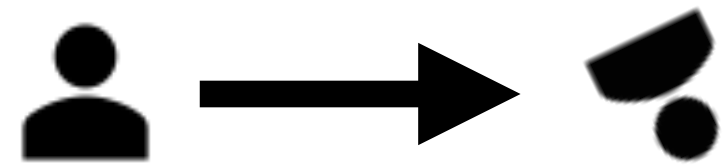
TRILHA DE PESQUISA OPERACIONAL

TRILHA DE ENGENHARIA DE SISTEMAS

TRILHA DE PROJETO PRÁTICO

TRILHA DE DESIGN DE SISTEMAS

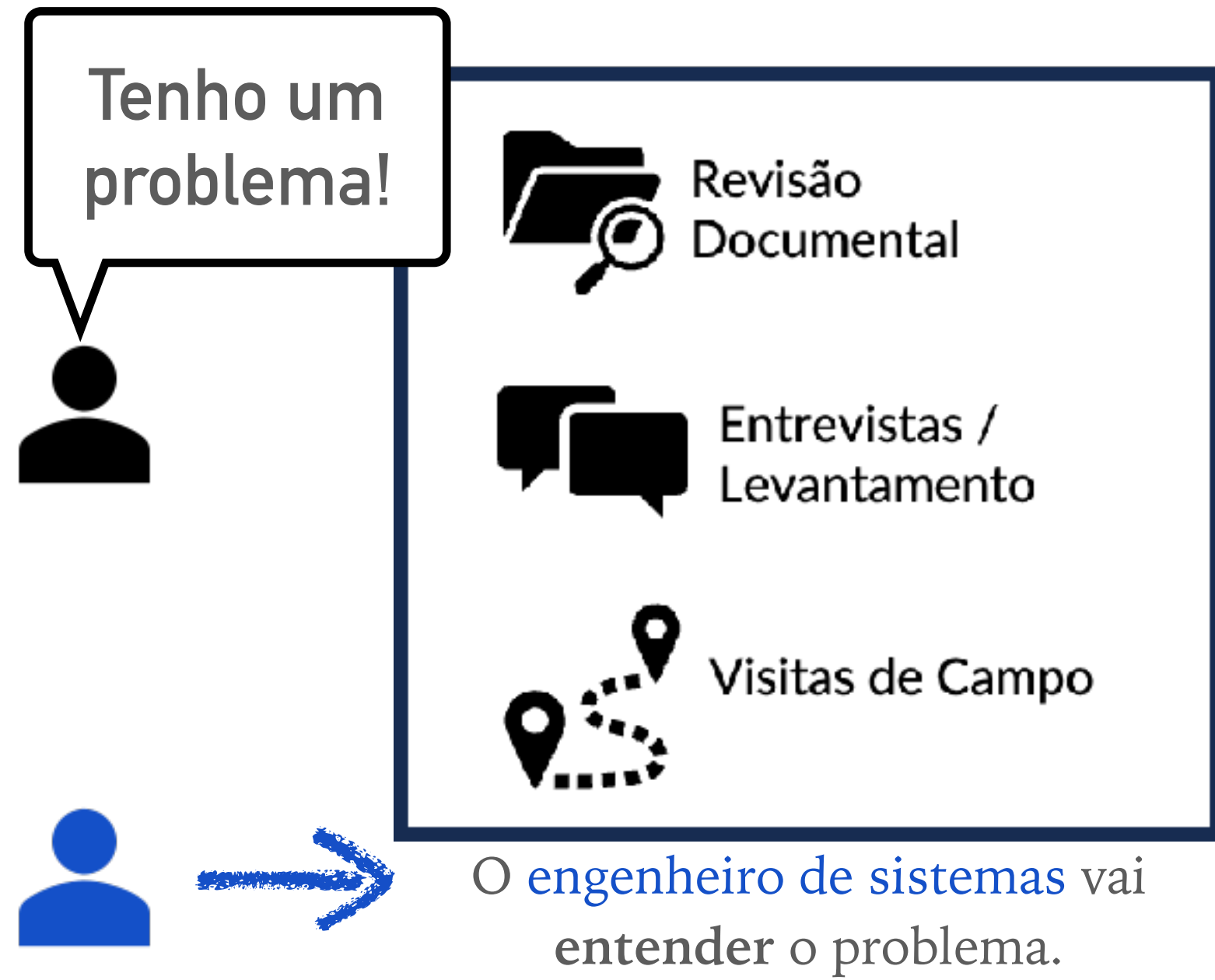
TRILHA DE MODELAGEM E SIMULAÇÃO



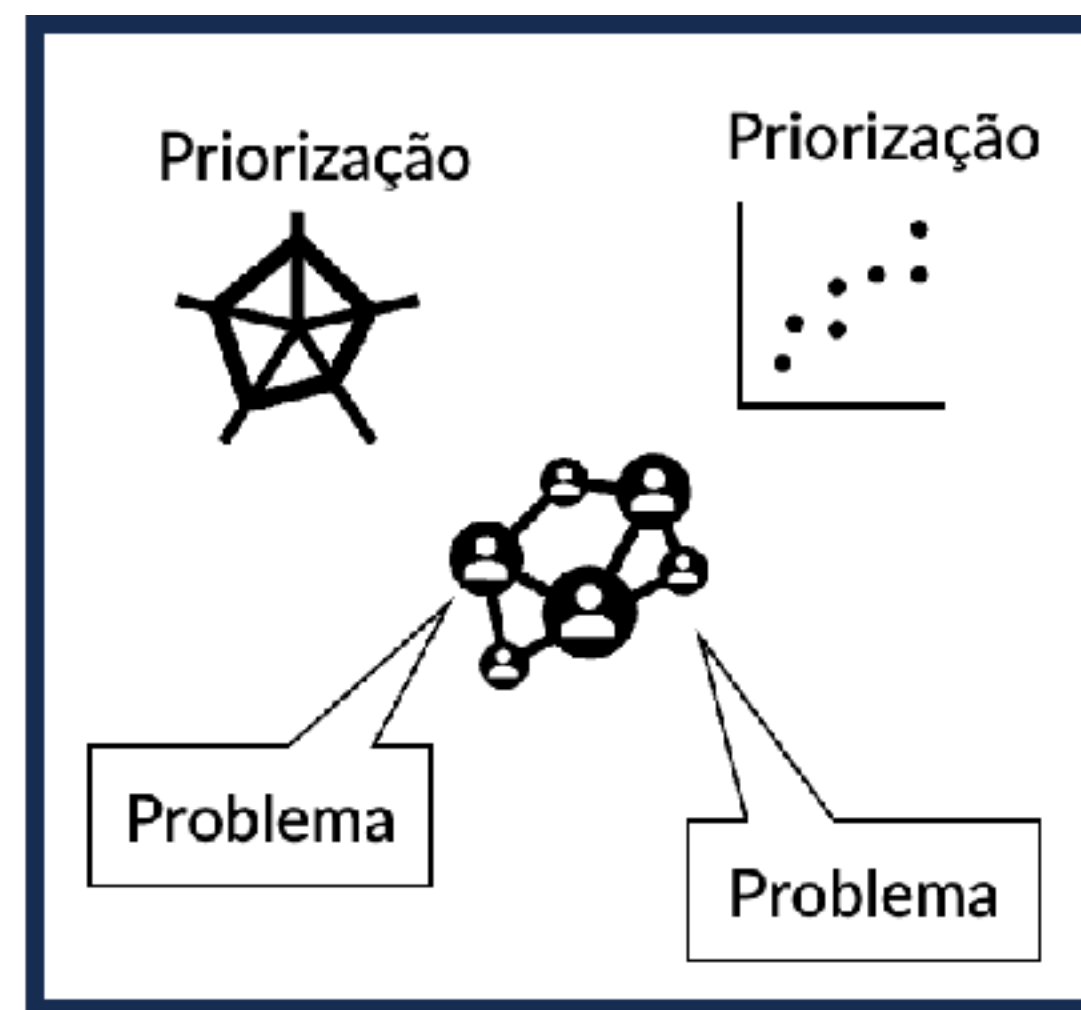
PROJECT-BASED
LEARNING



Bem ... um mini exemplo da rotina de um(a) Engenheiro(a) de Sistemas?!

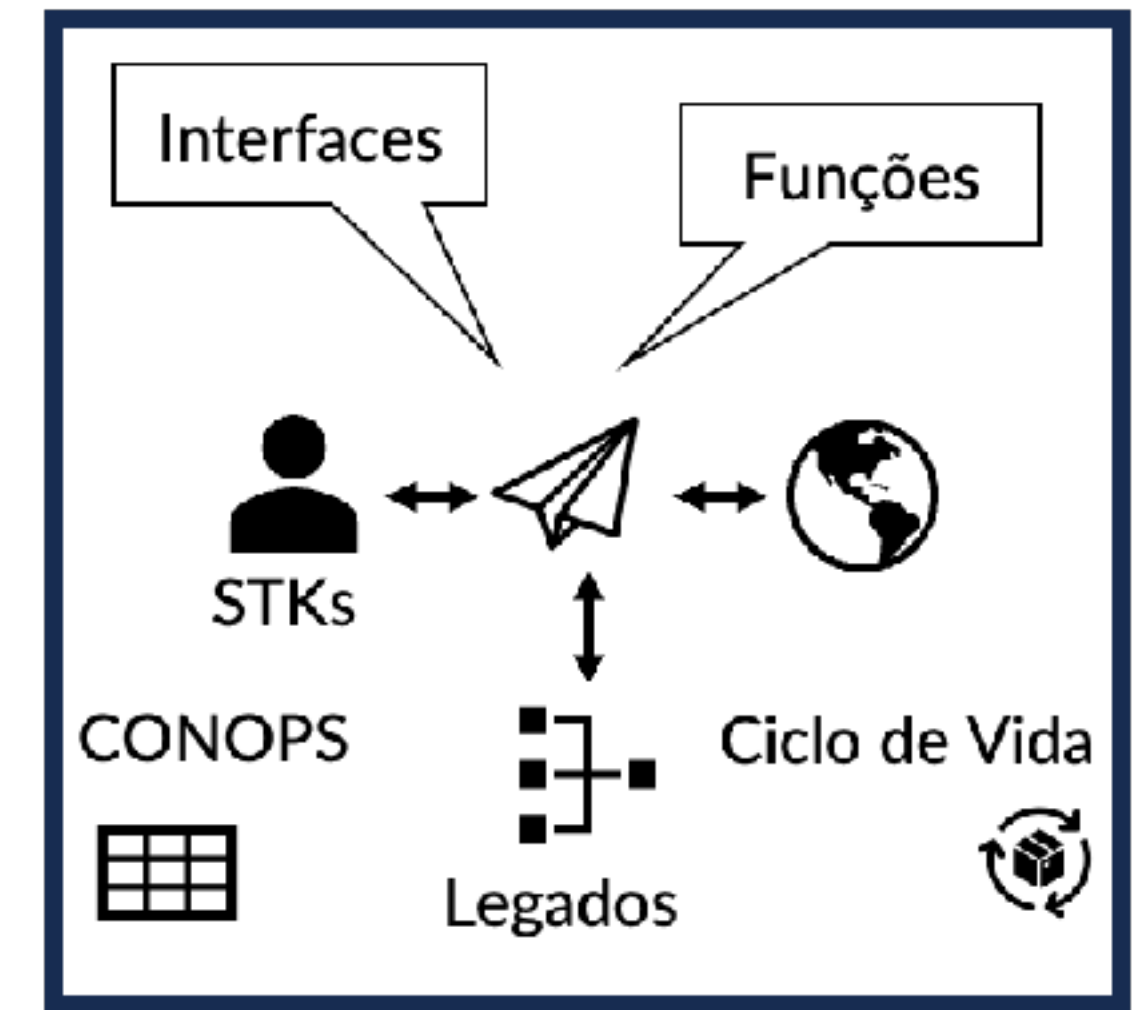
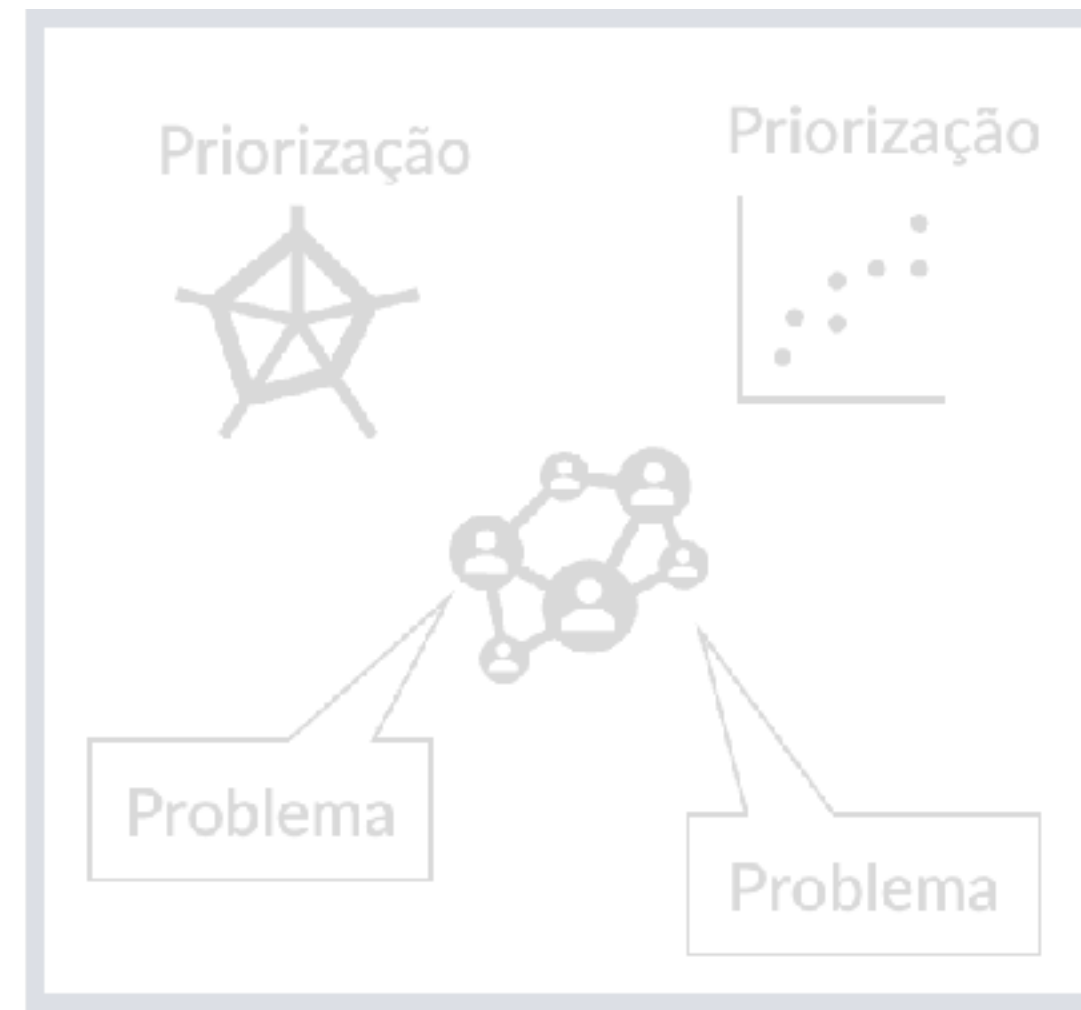






O [engenheiro de sistemas](#) vai organizar as necessidades dos stakeholders.



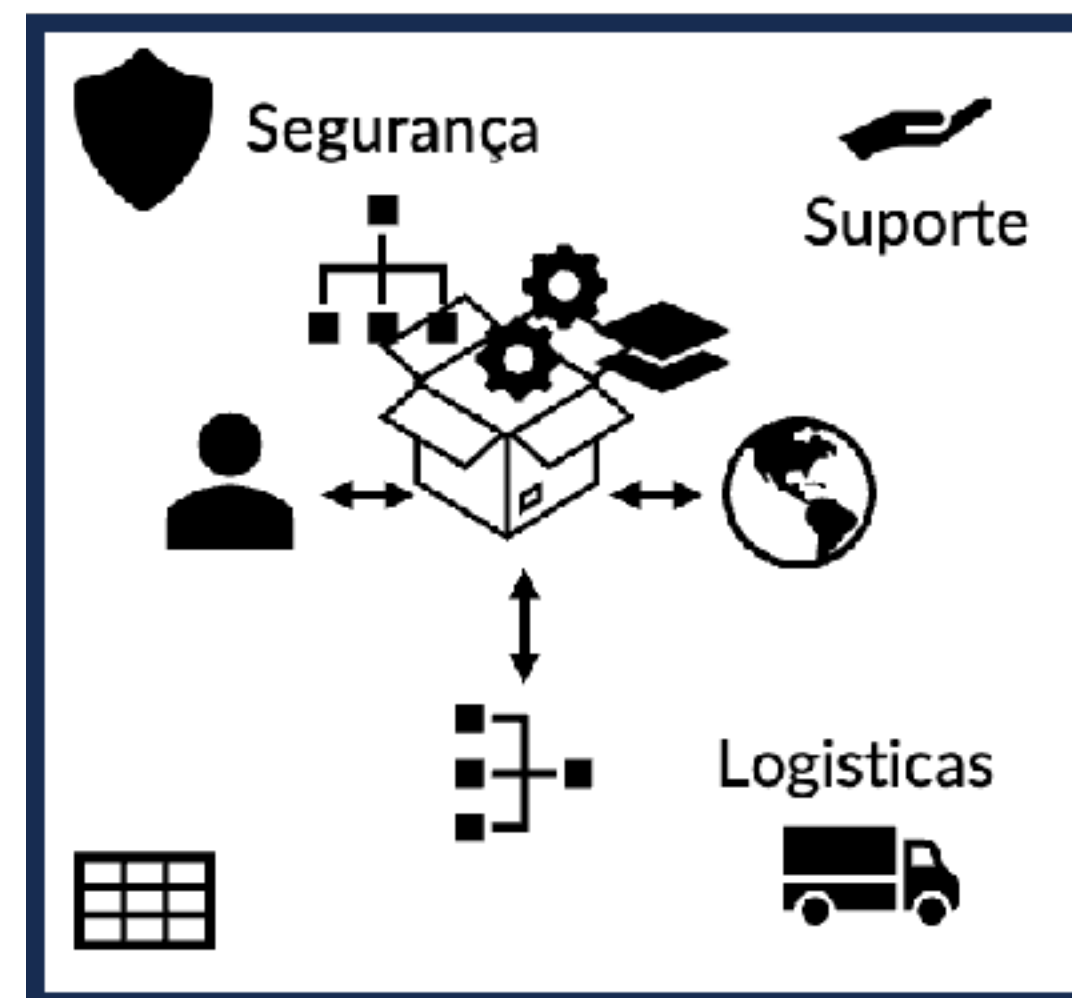
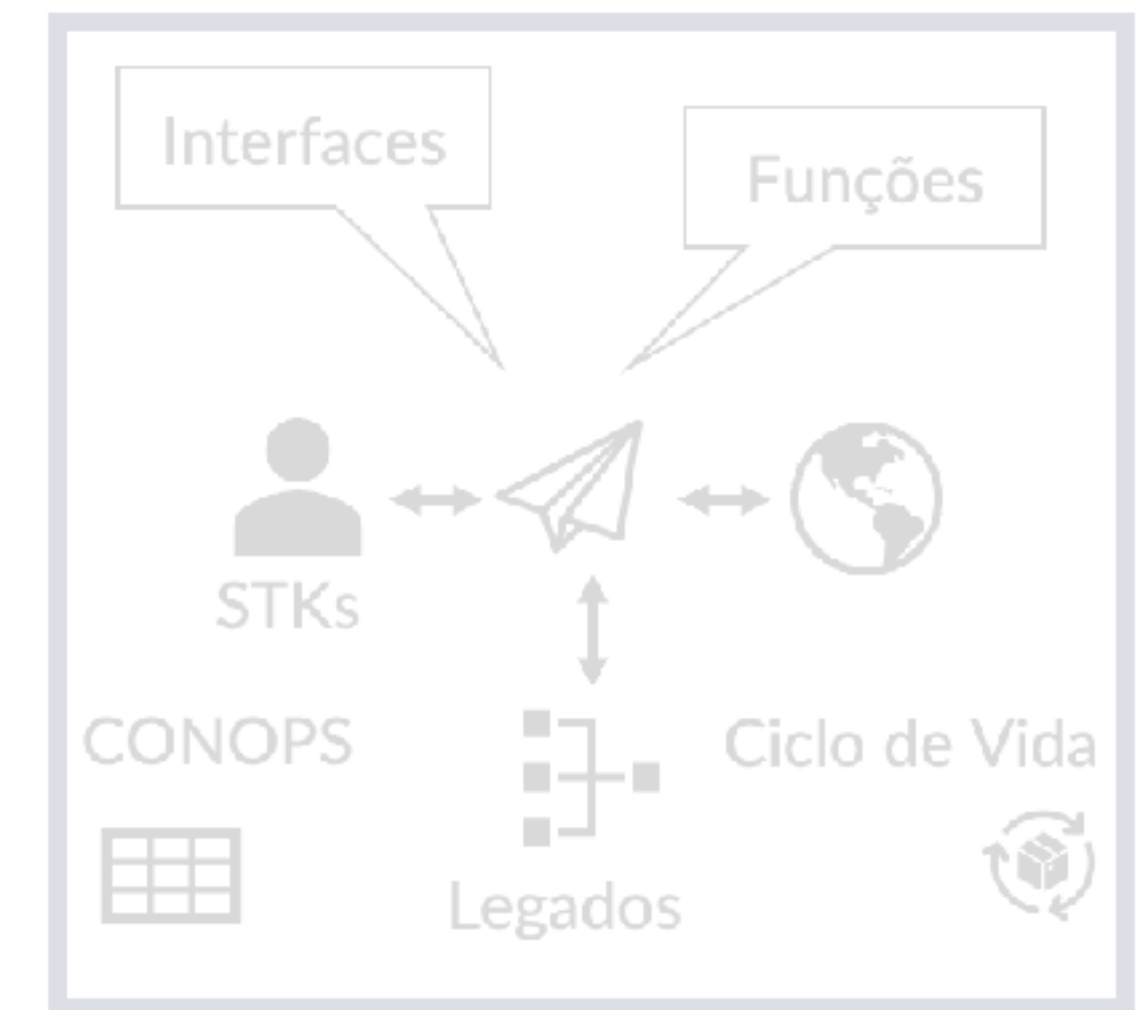
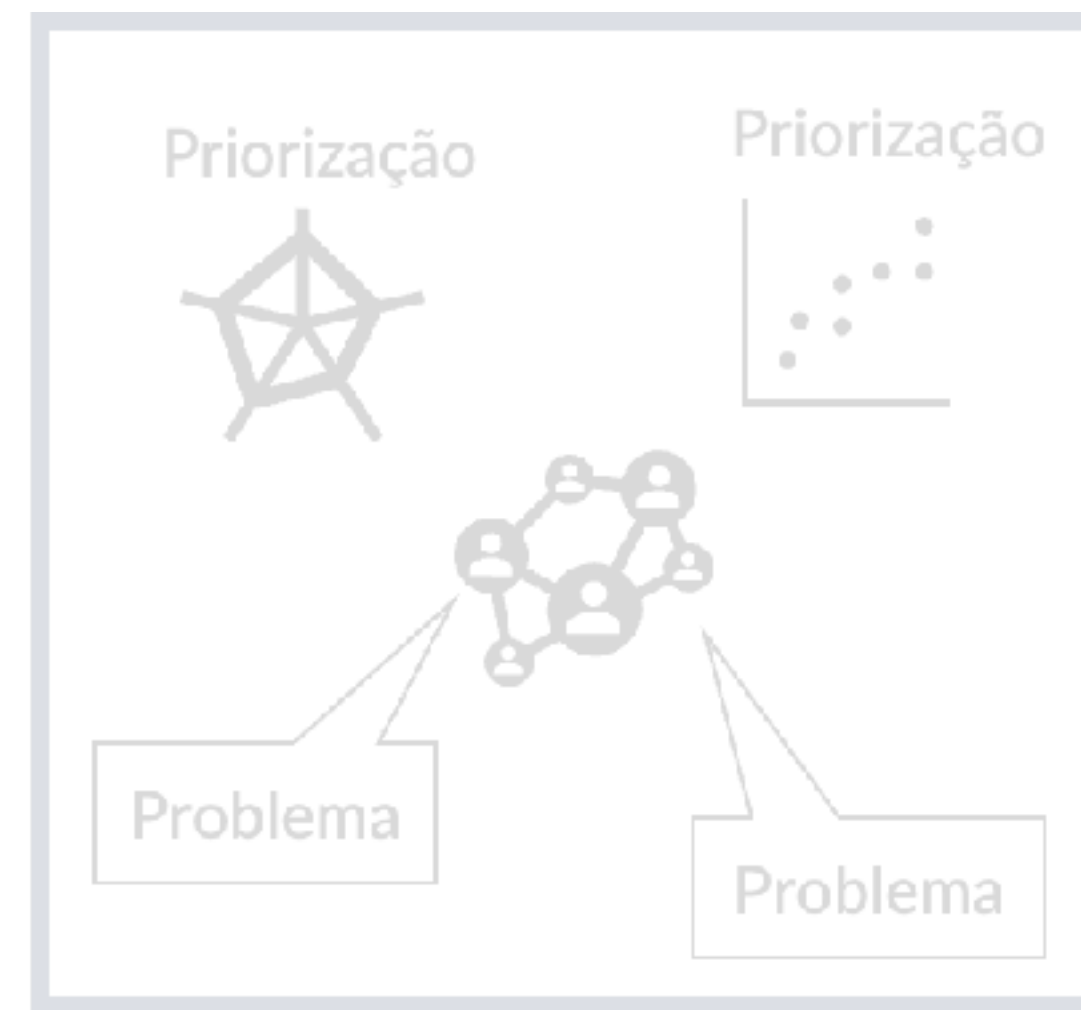


O [engenheiro de sistemas](#) vai propor um **conceito** de sistema que tenha a **missão** de atender o **que** os stakeholders precisam.

CONCEPT OF OPERATIONS

CONCEPT OF OPERATIONS





O [engenheiro de sistemas](#) vai decompor como o sistema deve funcionar observando os diferentes pontos de vista.

SYSTEM DECOMSTION

SYSTEM
VEHICLES

GROUND VEHICLES

GROUND
TRANSPORT

GROUND
TRANSPORT

GROUND
TRANSPORT

GROUND
TRANSPORT

GROUND
TRANSPORT

ROSTEELTY

FLIGHT
TRANSPORT

AIR M
TRANSPILTY

GROUND VEHICLE

RIVER TRANSPORT

RIVER TRANSPORT

AIR MONSPORT

SUSTAINBLTY

STAINABLY

NOTAINNE

INTEGRATION

INGROSS

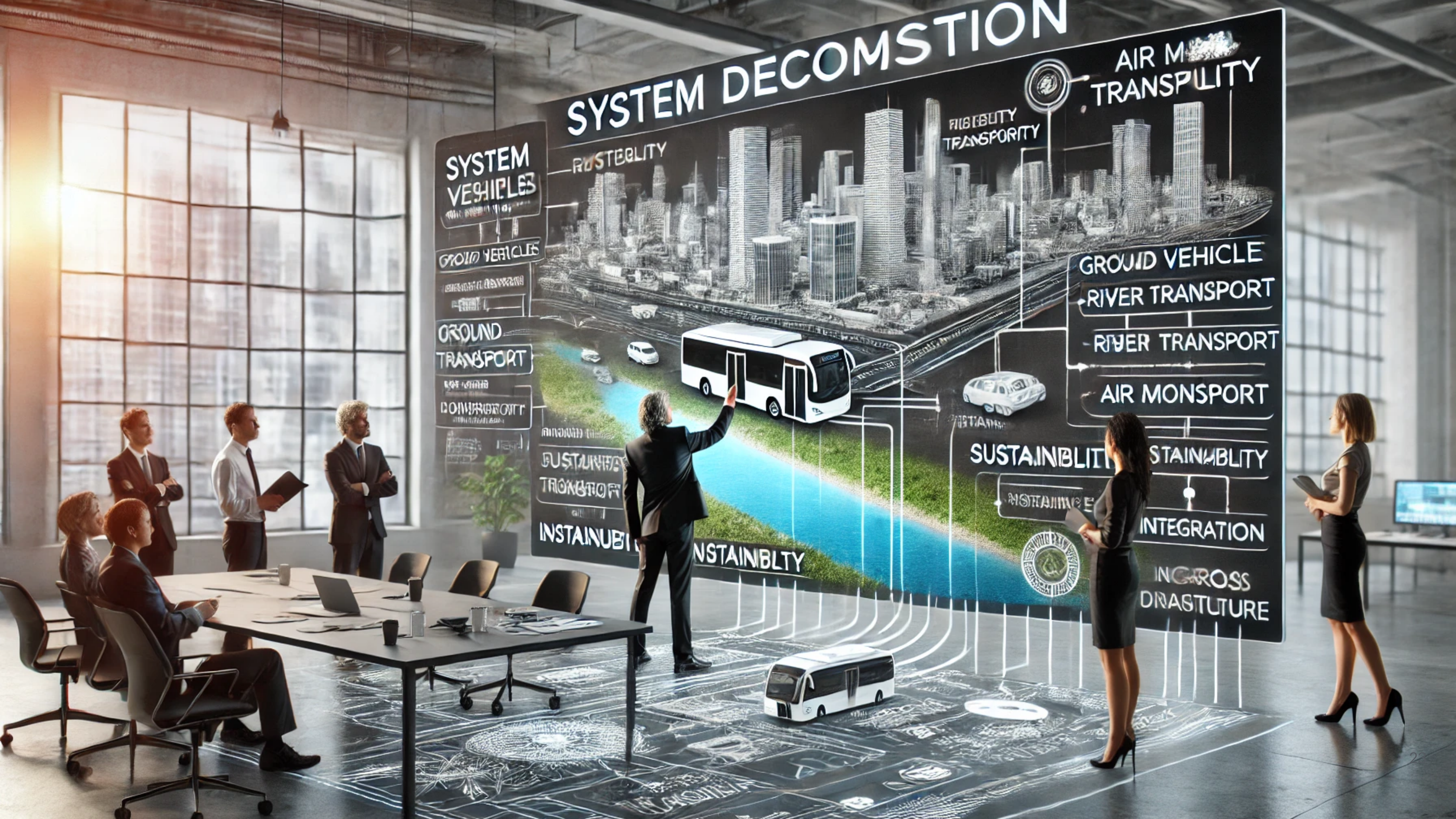
DRASTUTURE

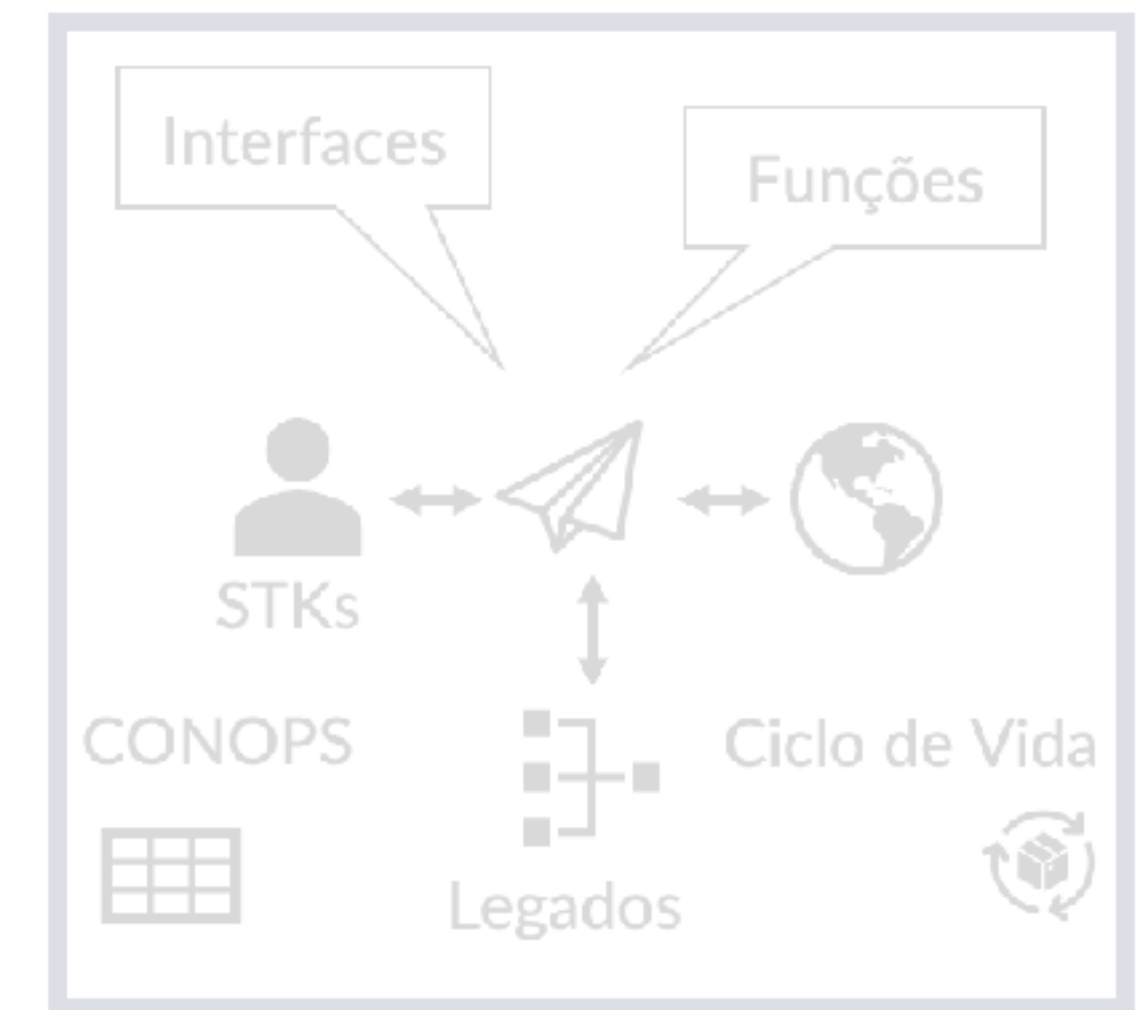
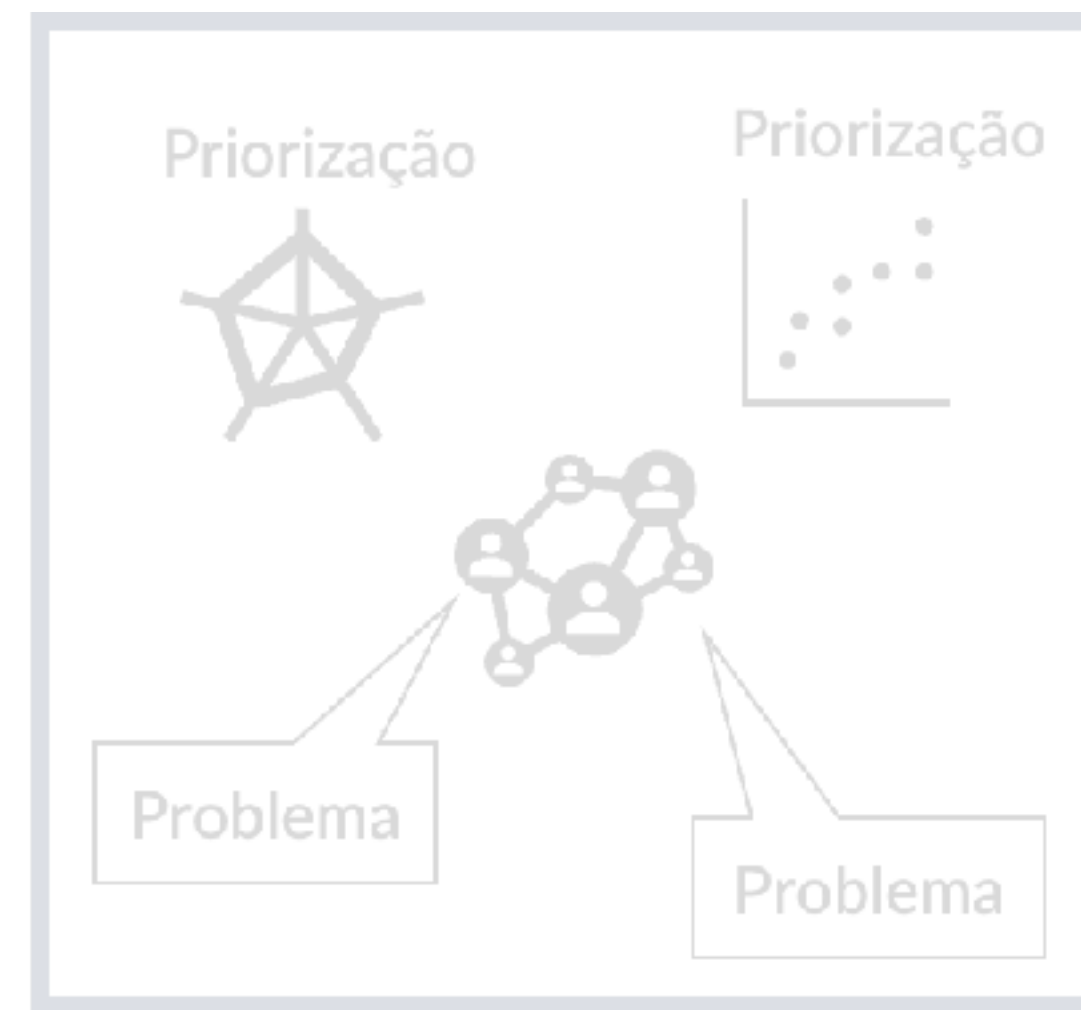
SUSTAINBLTY

TRONSTOF

INSTAINUBI

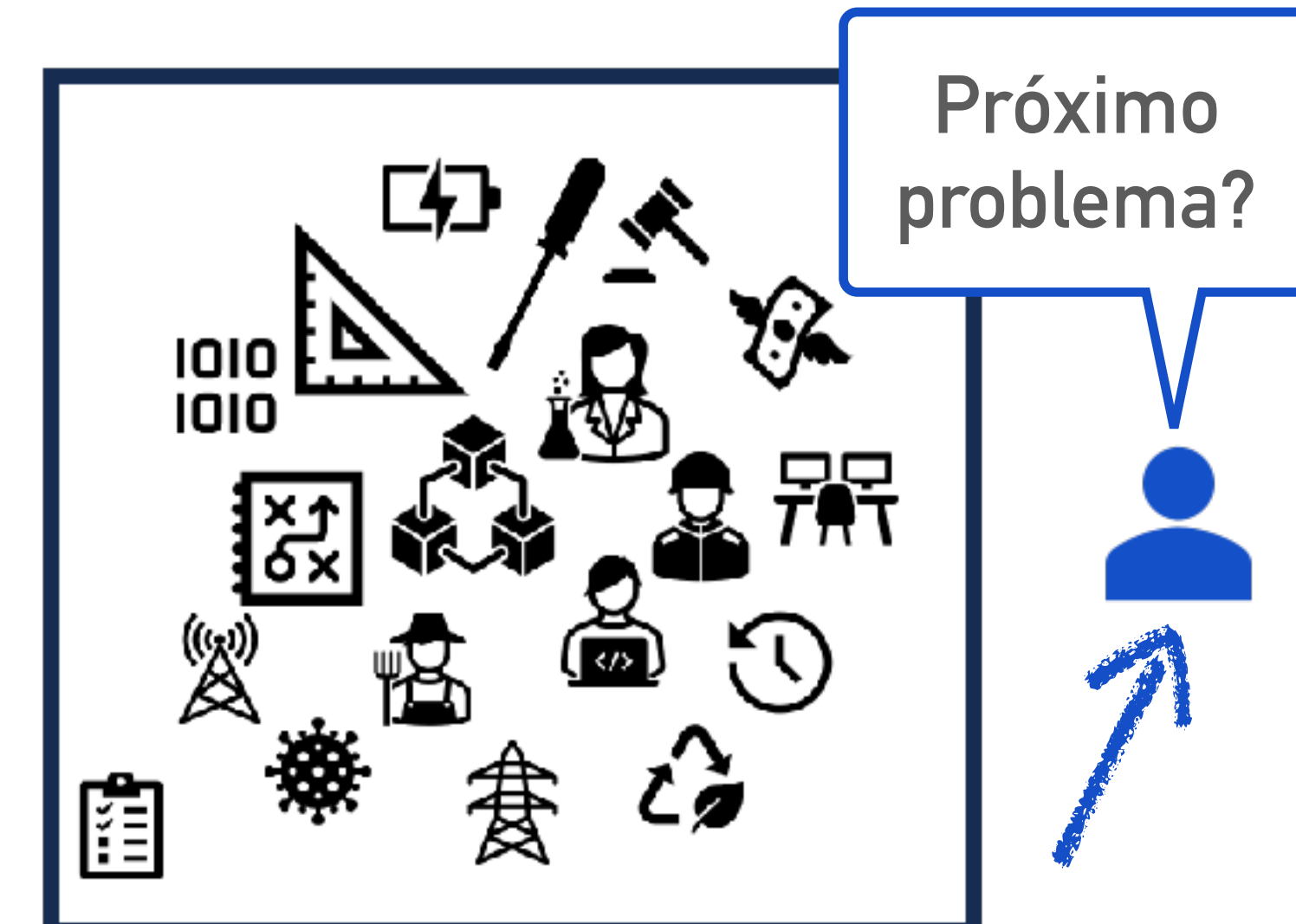
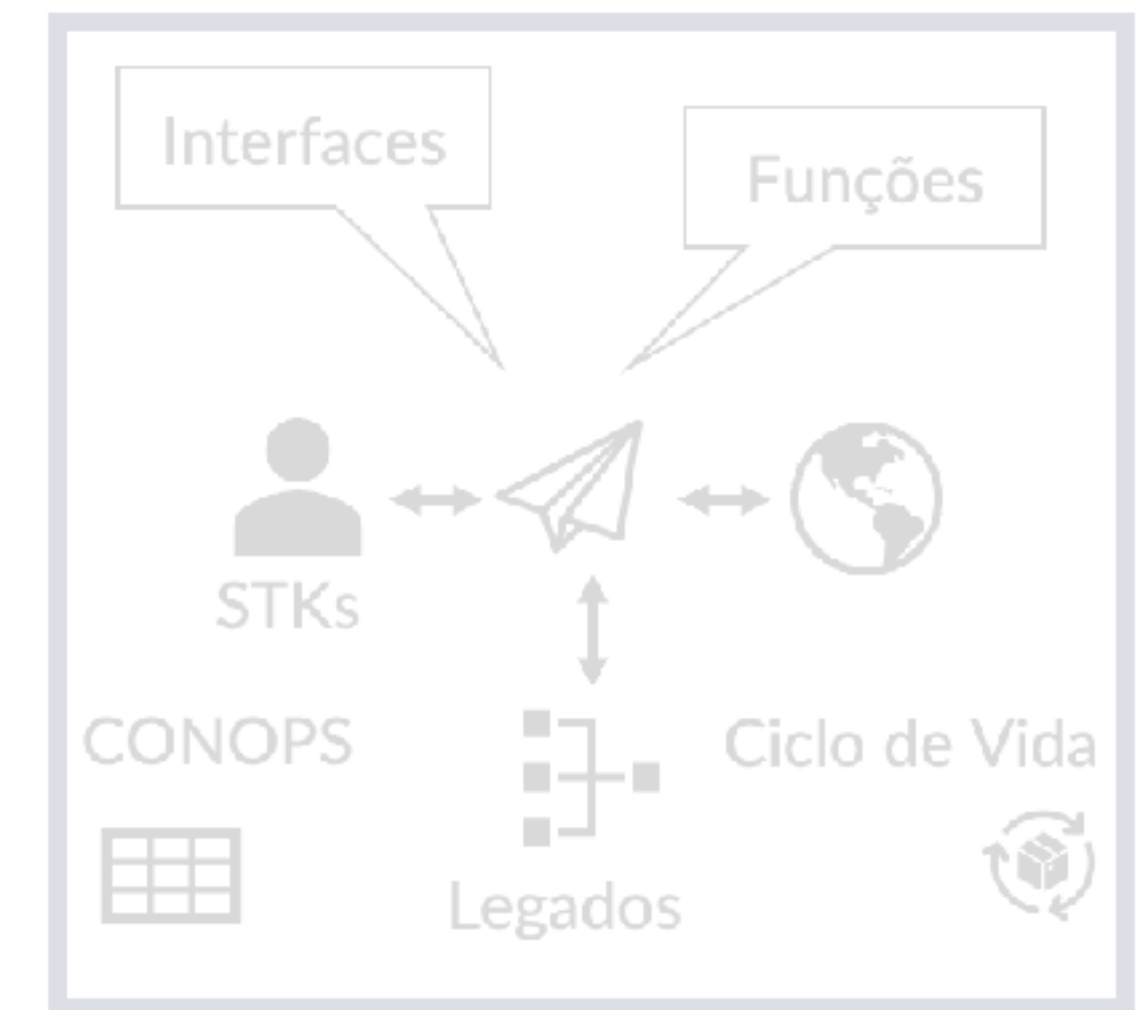
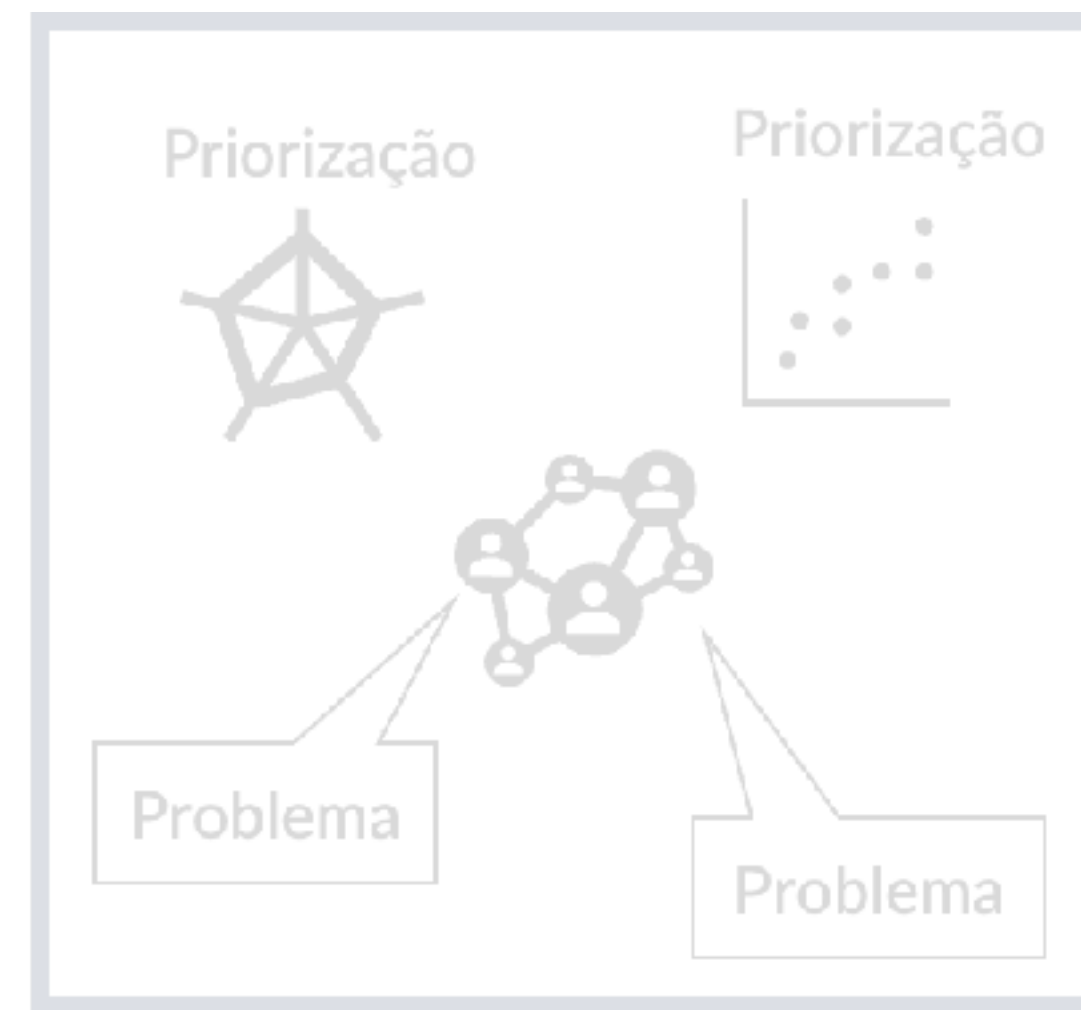
INSTAINBLTY





O [engenheiro de sistemas](#) vai estruturar métodos para acompanhar se o sistema correto foi feito e se foi feito da maneira correta.





O **engenheiro de sistemas** vai acompanhar o ciclo de vida, a complexidade das interfaces, registrar mudanças e lições aprendidas.



PROFESSIONAL
SYSTEMS
EYSTEM
IN US

SYSTEM IN WESTION

onde pode ser usado ?



Mais óbvio...



E também...



e..... também..

Palavras finais



CUSTOMER EXPECTATION



CUSTOMER BUDGET



Design da Força
(PBC)
EMAER – 6SC4

C4ISR
COMAE./ COMPREP

Arquitetura e Requisitos
EMAER – 7SC

Teste e Avaliação
IPEV / IFI / IAOp

Logística/Suporte
PAMA / GAP / GAC

Engenharia Digital
DCTA



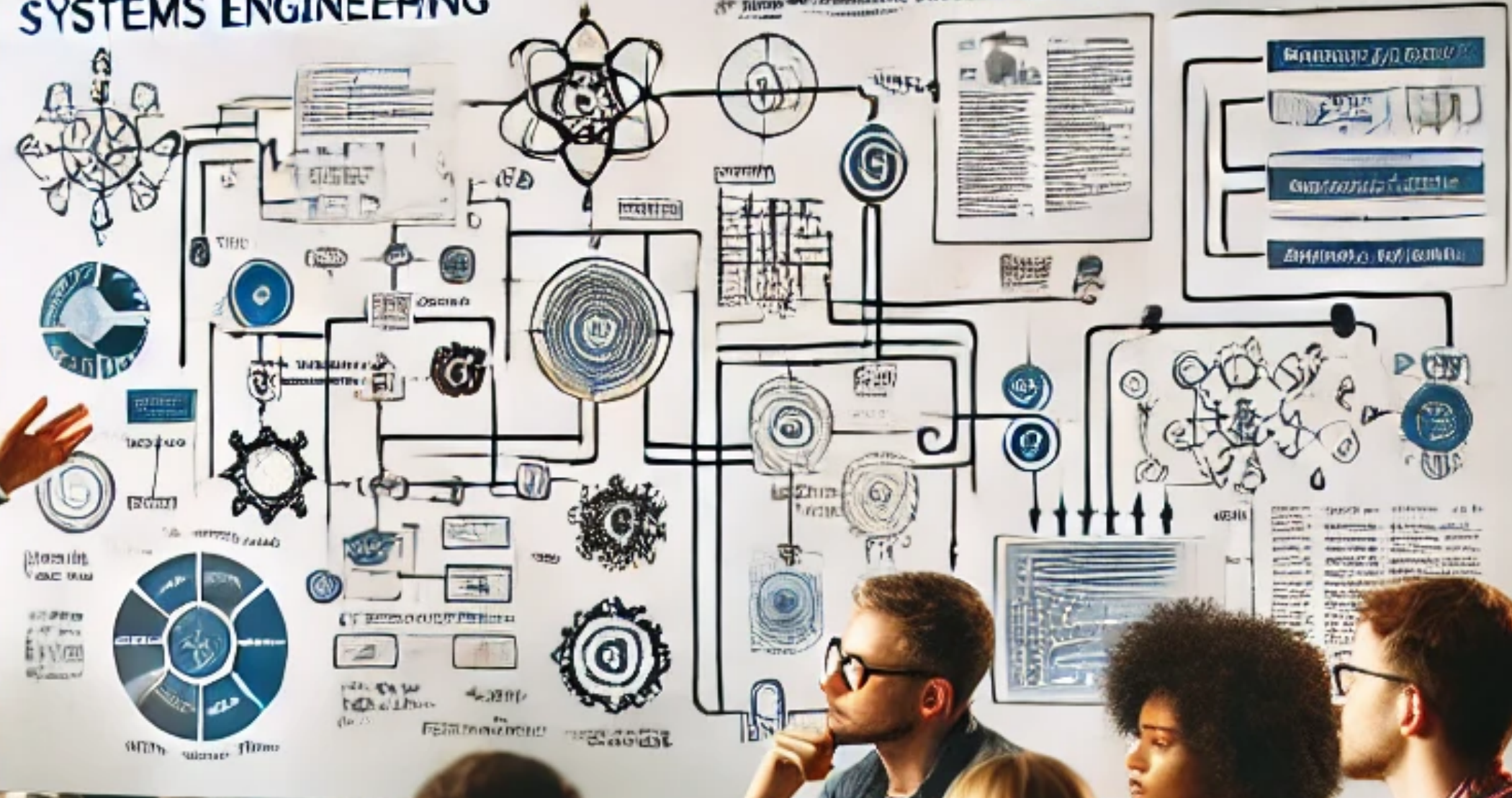
*O Engenheiro de Sistemas pode
trabalhar em múltiplas áreas que
envolvem sistemas complexos.*

SYSTEMS
ENGINEERING



SYSTEMS ENGINEERING

SYSTEMS ENGINEERING



SYSTEMS ENGINEERING

DESIGNING THE FUTURE

SYSTEMS
ENGINEERING

SYSTEMS

SYSTEMS
ENGINEERING

SYSTEMS
ENGINEERING

SYSTEMS
ENGINEERING

SYSTEMS



Perguntas?

Prof. Dr. Christopher Shneider
Cerqueira (chris@ita.br)

