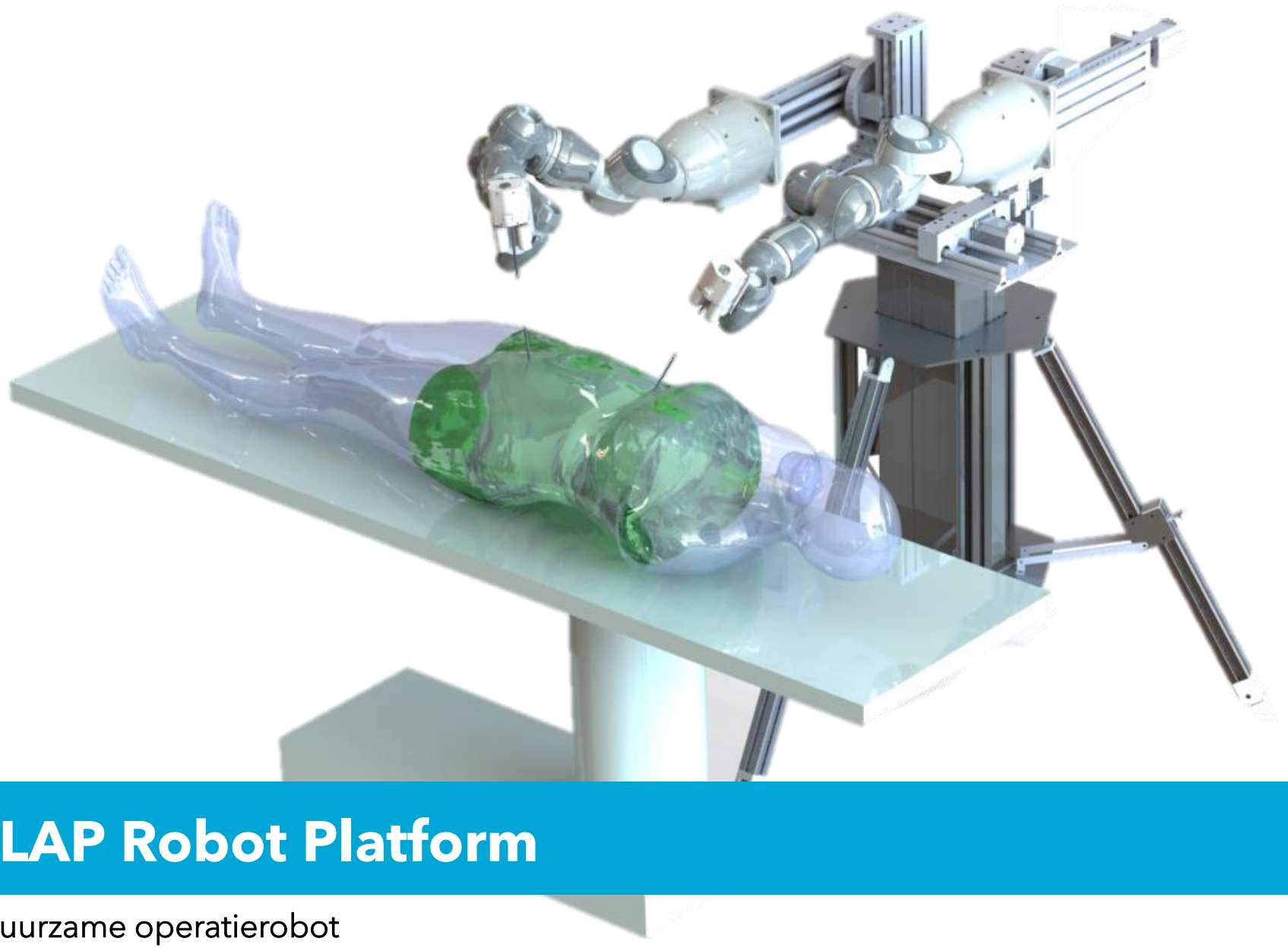


ADLAP Robot Platform

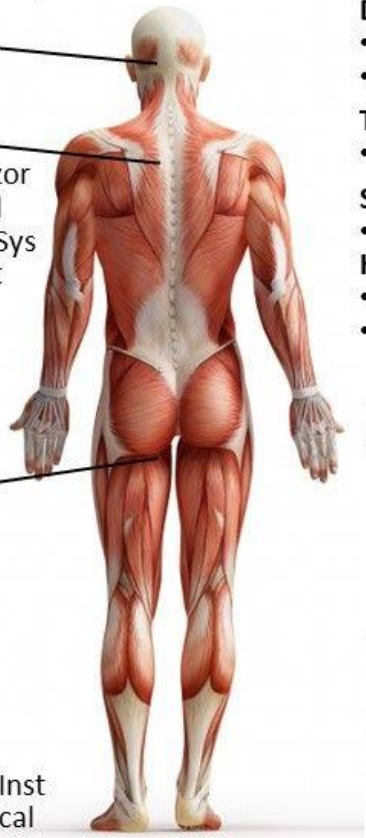
Een duurzame operatierobot

TU Delft

Laparoscopische chirurgische robot systemen

TU Delft

Robotic Surgery Platforms
115 Companies



Hair
- Restoration Robotics

Spine
- Medtronic/Mazor
- Globus Medical
- Interventional Sys
- Zimmer Biomet
- Nuvasive
- J&J/Dupuy
- Tinavi
- Accelus
- eCential

Transanal
- EDAP TMS
- NISI
- Invendo
- Endotics

General
- Kuka
- Microsure
- Medical Micro Inst
- Microbot Medical
- Histosonics

Neuro
- Medtronic
- Synaptive
- Zimmer
- Monteris
- Elekta
- Renishaw
- AiM Medical
- BrainLab
- Varian
- IMRIS
- Remebot
- Insightec
- OrbSurgical
- Endoquest
- Xcath
- Eindhoven Med
- Medtronic
- Brain Navi
- Sinovation
- Aesculap
- Koh Young
- Tamar
- Zeiss

Dental
- Neocis
- Remebot

Thyroid
- Theraclion

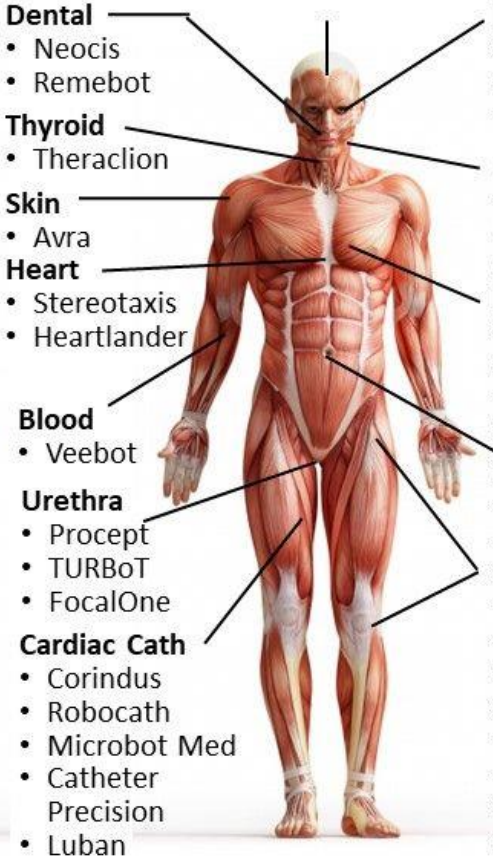
Skin
- Avra

Heart
- Stereotaxis
- Heartlander

Blood
- Veebot

Urethra
- Procept
- TURBoT
- FocalOne

Cardiac Cath
- Corindus
- Robocath
- Microbot Med
- Catheter Precision
- Luban



Eyes
- Preceyes
- ForSight
- AcuSurgical
- Cambridge Consult
- Keranova
- Horizon

ENT
- Intuitive/SP
- Medineering
- Galen Robotics
- iotaMotion
- Collin Med
- Cascination

Lungs
- J&J/Auris
- Intuitive/Ion
- Noah Medical
- NDR Medical

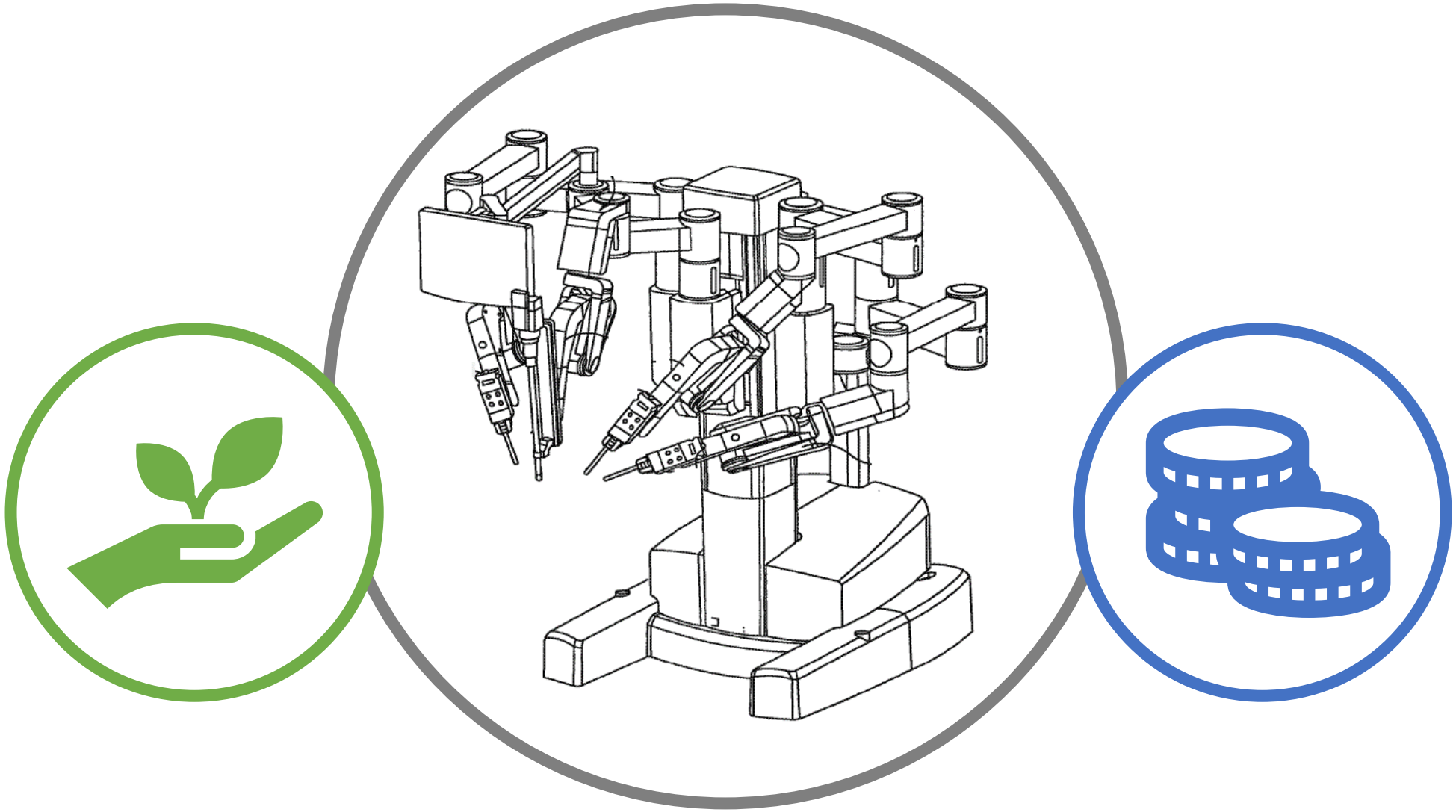
Knee/Hip
- Stryker/Mako
- THINK Surgical
- Smith & Nephew
- Zimmer Biomet
- Tinavi
- OmniLife
- J&J/Velys
- AOT
- Monogram Ortho
- Ganymed
- Microport
- Robossis
- Dexterite Surgical
- Levita Magnetics
- Medical Micro
- EndoControl
- OrionPax-MST
- AKTORmed
- Endomaster
- Human Xtensions
- ACTIV Surgical
- Epione
- Sina Robotics
- ValueBioTech
- USMI
- XACT
- Perfint
- Freehand
- Riverfield
- Moon Surg
- MicroPort
- Endiatx

Abdomen
- Intuitive/dv
- Asensus Surgical
- Accuray
- CMR Surgical
- Titan Medical
- Meere Co.
- Micro Hand S
- J&J/Verb
- Medtronic
- Medicaroid
- Virtual Incision
- Vicarious Surgical
- Momentis
- Distal Motion
- Kongduo
- Avatera
- Lapara Surgical
- SS Innovations
- DocRobo

Wildgroei ontwikkelaars operatierobots

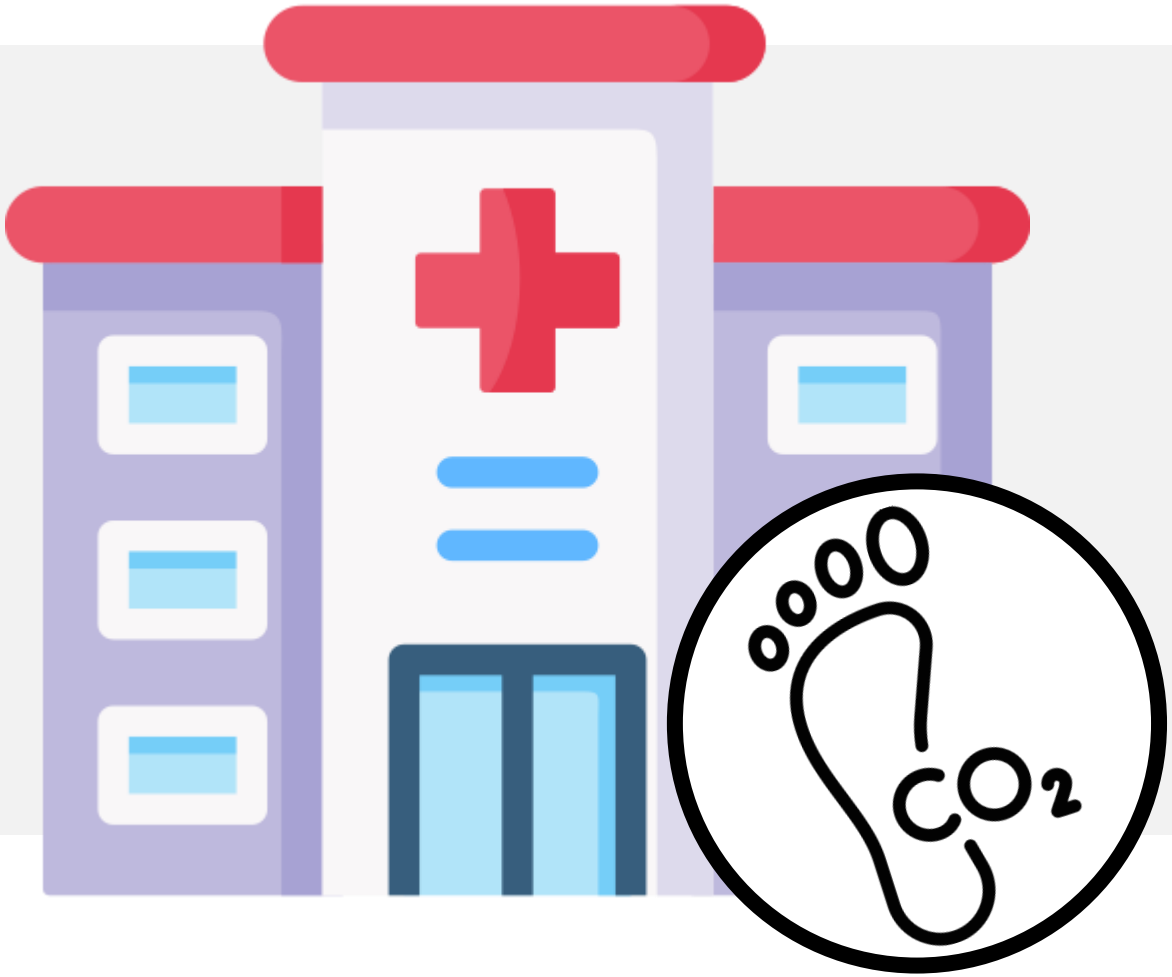
TU Delft

Roger Smith, July 2022, pre-publication of *Rise of the Intelligent Health System*



Duurzaamheid & Kosten

TU Delft



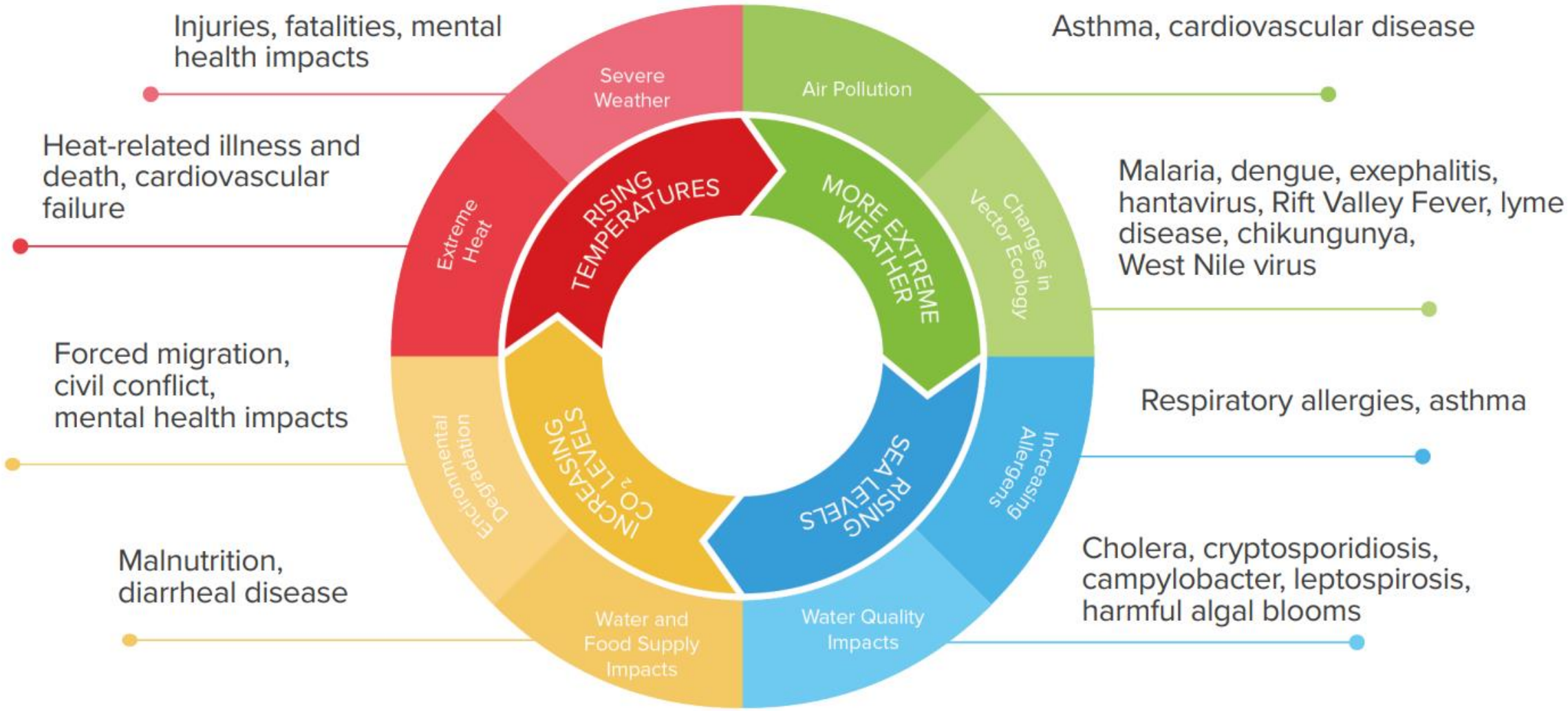
Carbon emission globally **4.4%**

Carbon emission Nederland **7%**

Milieu impact gezondheidszorg

TU Delft

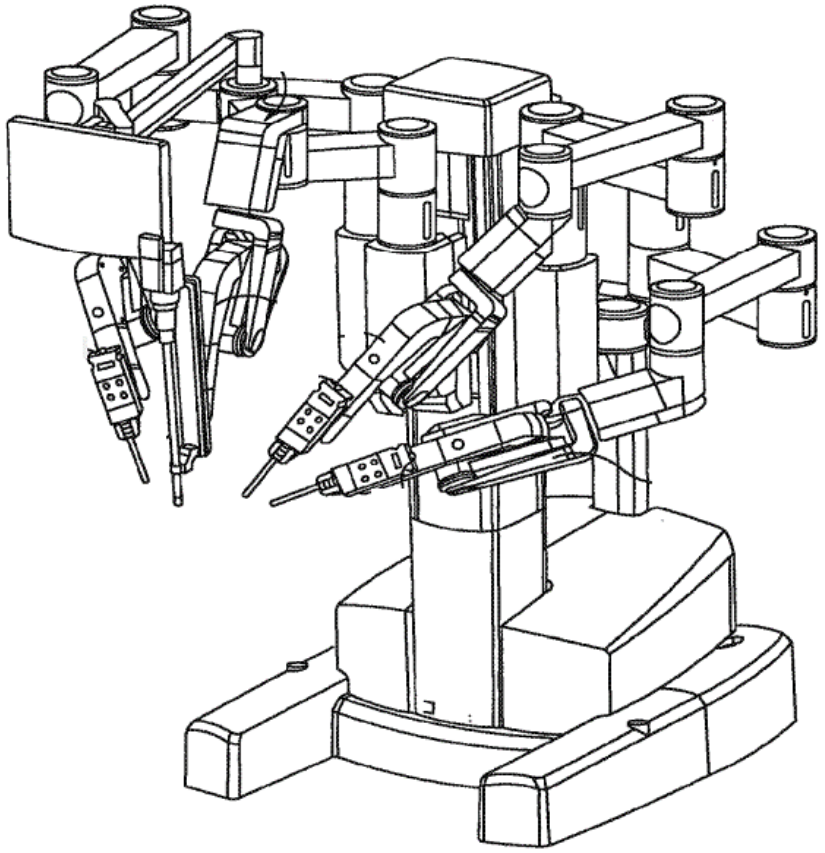
Health Care Without Harm, 2019;
RIVM, Milieuvoetafdruk rapportage, 2023



Milieu impact gezondheidszorg

TU Delft

Health Care Without Harm, 2019;



↑ 43.5%

GHG emissions

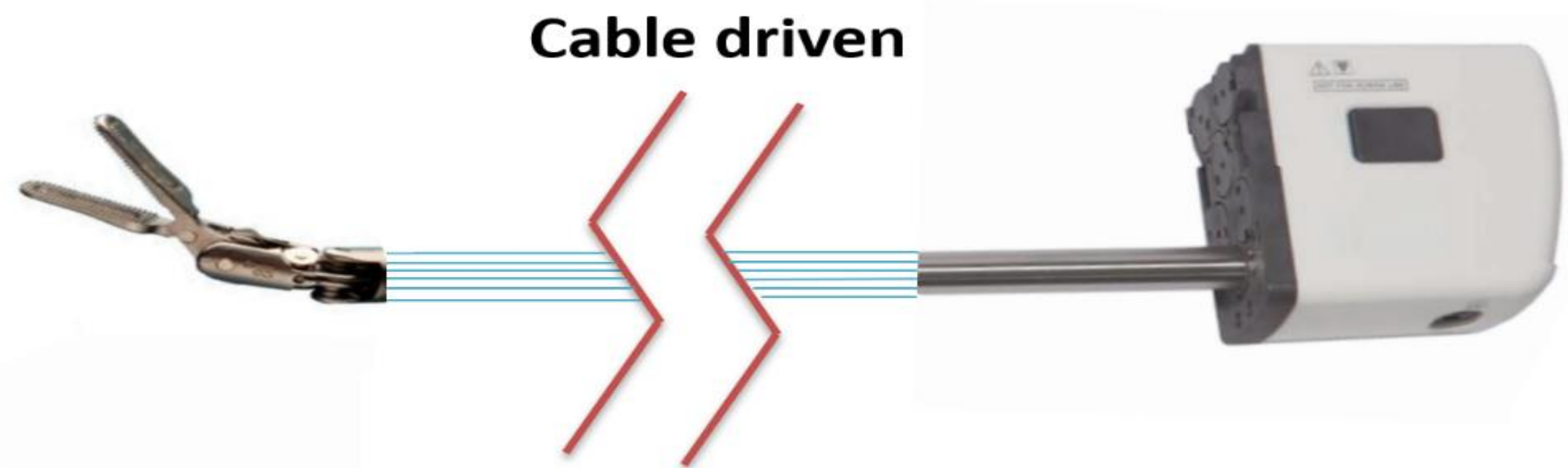
↑ 24%

Waste production

Duurzaamheid operatierobots

TU Delft

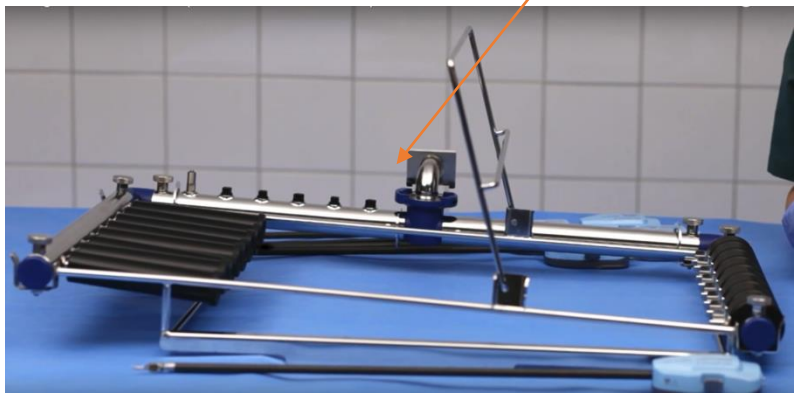
Environmental sustainability in robotic and laparoscopic surgery: systematic review. 2022



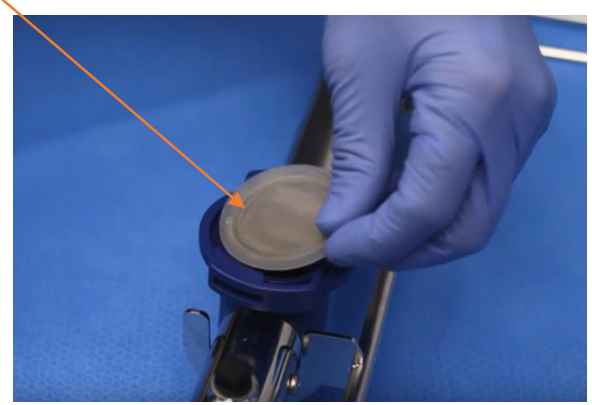
Kabel gestuurde robot instrumenten

Special connection mounts for tip

Special connection mounts for base



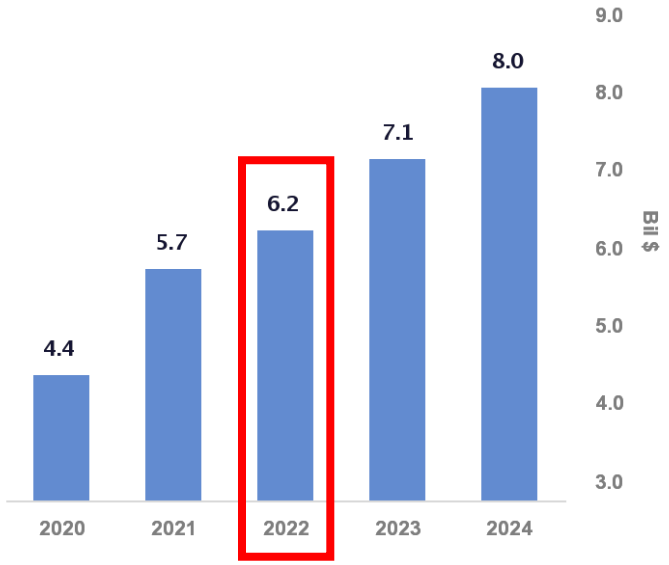
Special trays/methods for instrument positioning



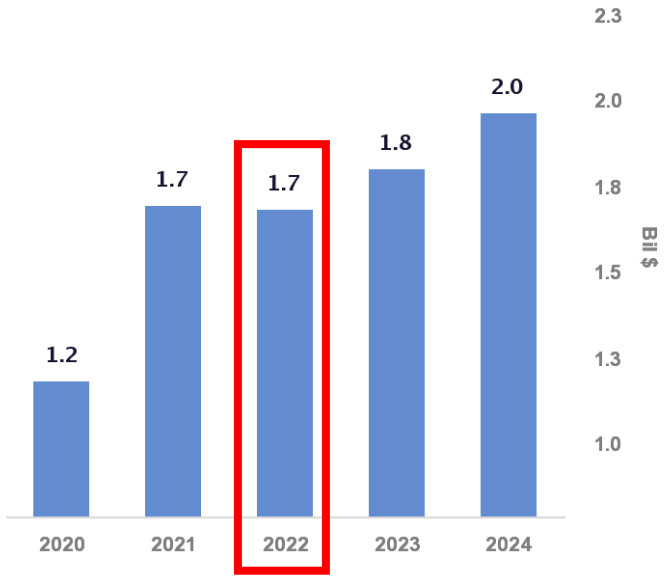
Special methods to clean tray

Het onschoonmaakbare schoonmaken

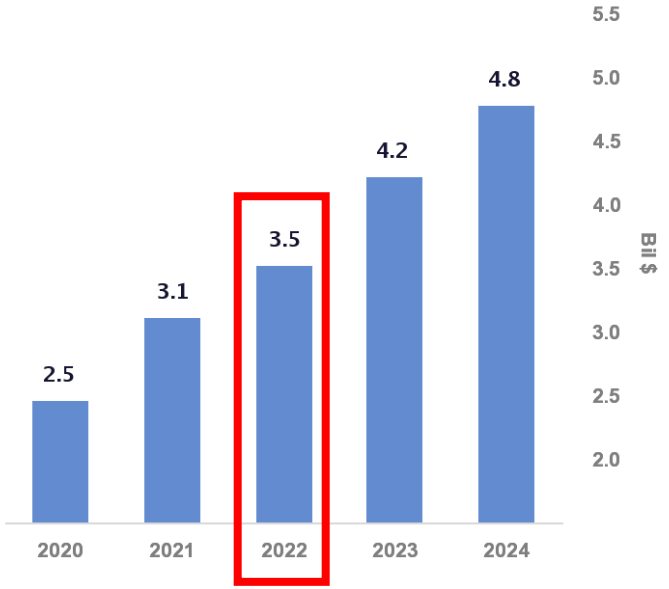
TU Delft



Total revenue



Surgical systems Revenue

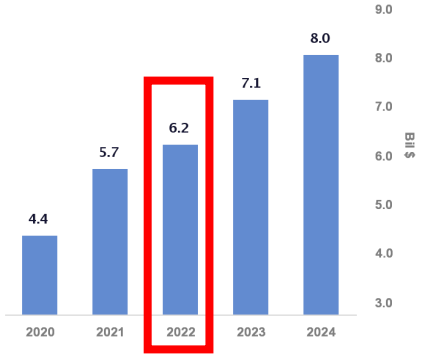


Instrument & Accessories Revenue

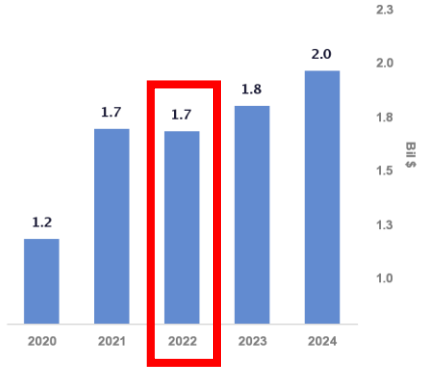
Razor-blade model

TU Delft

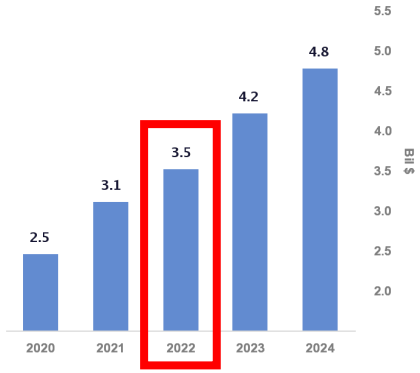
Trefis, 2023



Total revenue

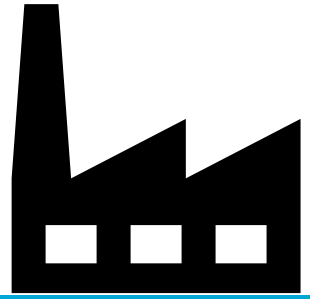


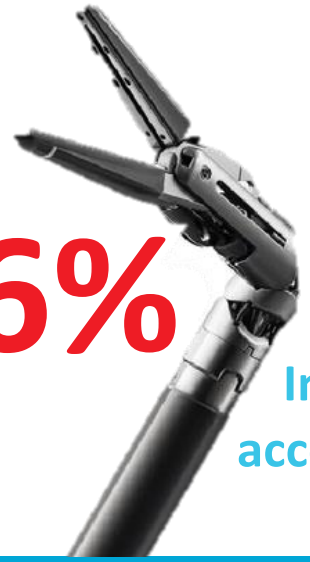
Surgical systems Revenue



Instrument & Accessories Revenue

Disposables waste 2025:
10 – 15 mil. instruments/year





56.6%

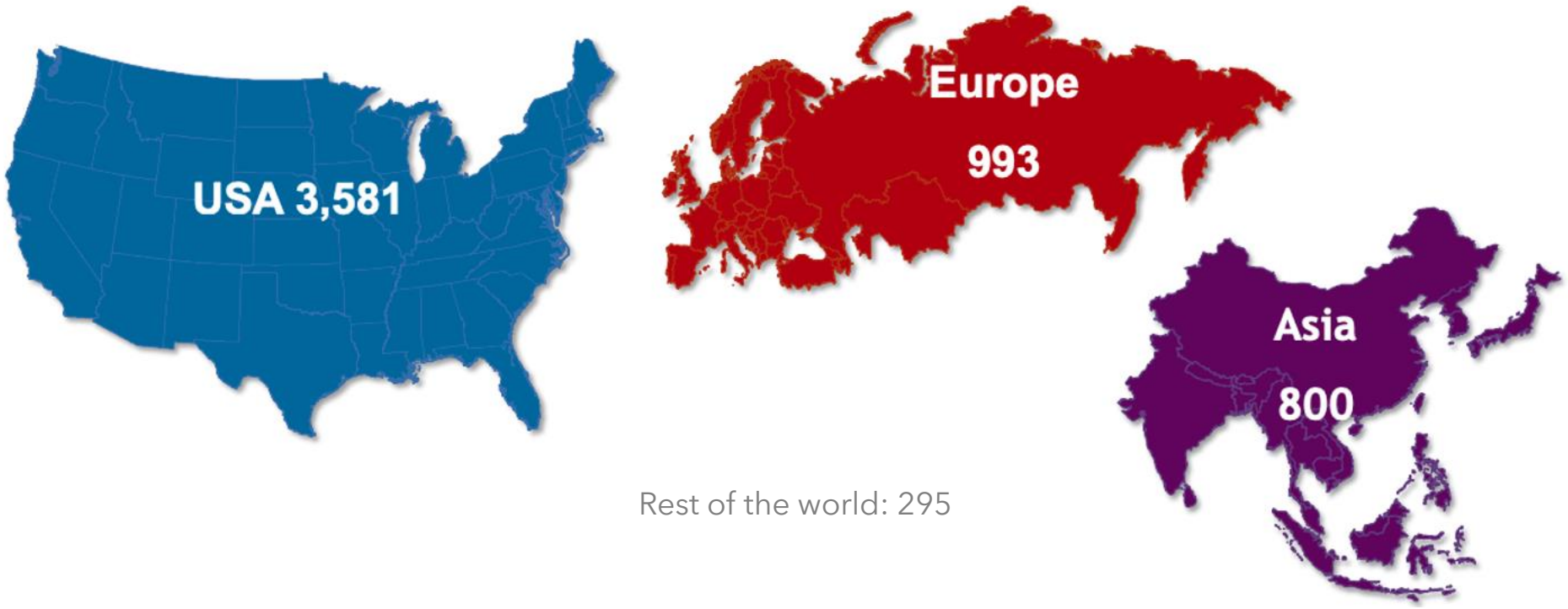
Instruments & accessories

Razor-blade model

TU Delft

Trefis, 2023
Forbes, 2019

5,669 systems worldwide

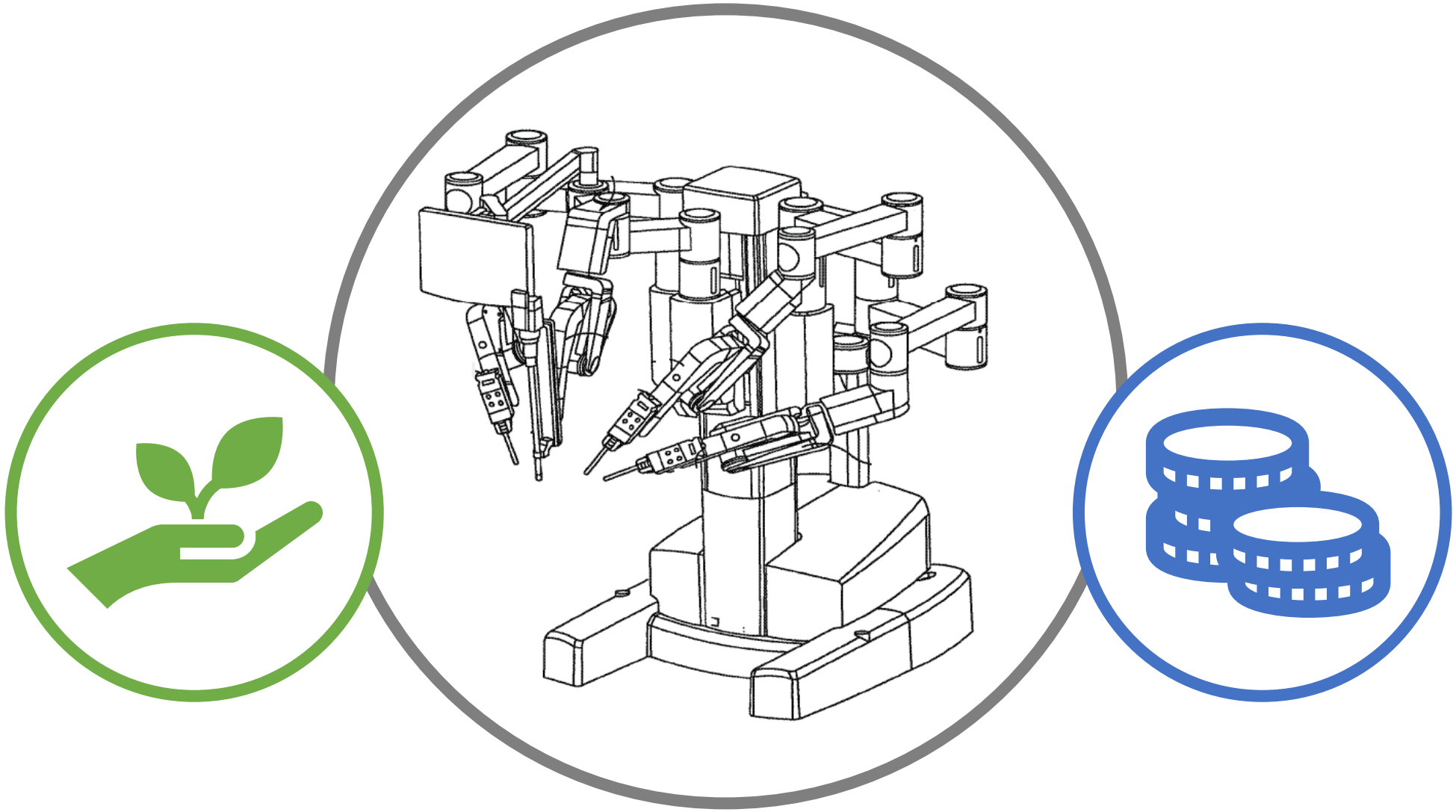


Rest of the world: 295

Operatierobots wereldwijd

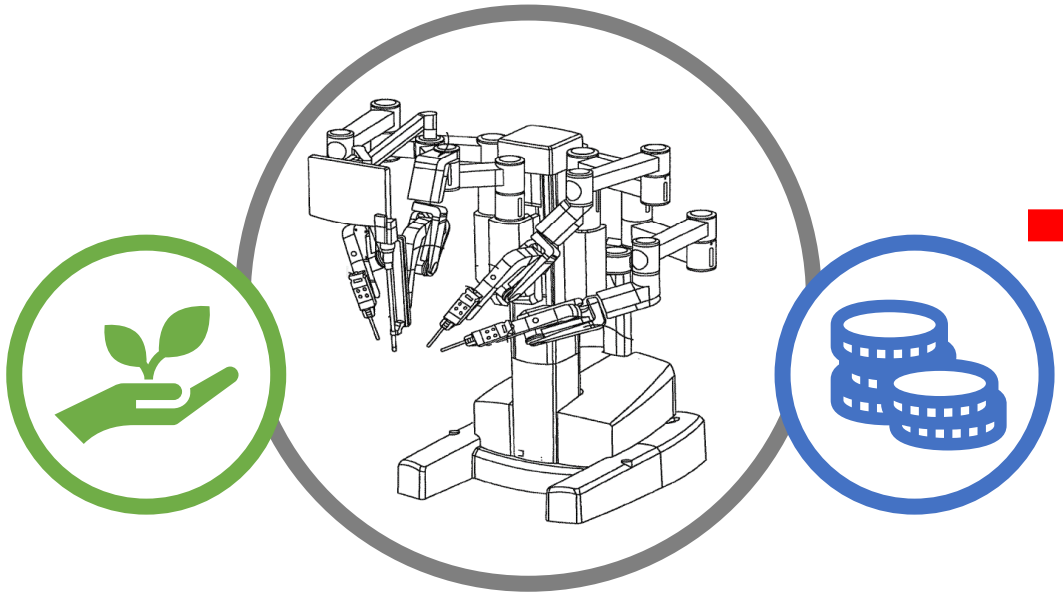
TU Delft

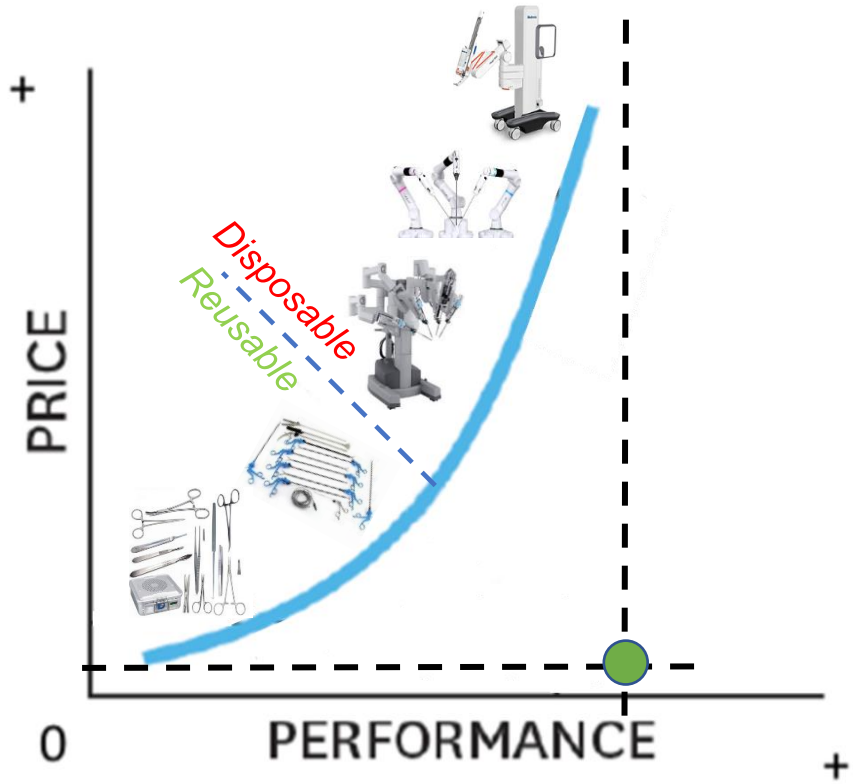
Intuitive Surgical, 31 March, 2020



Duurzaamheid & Kosten

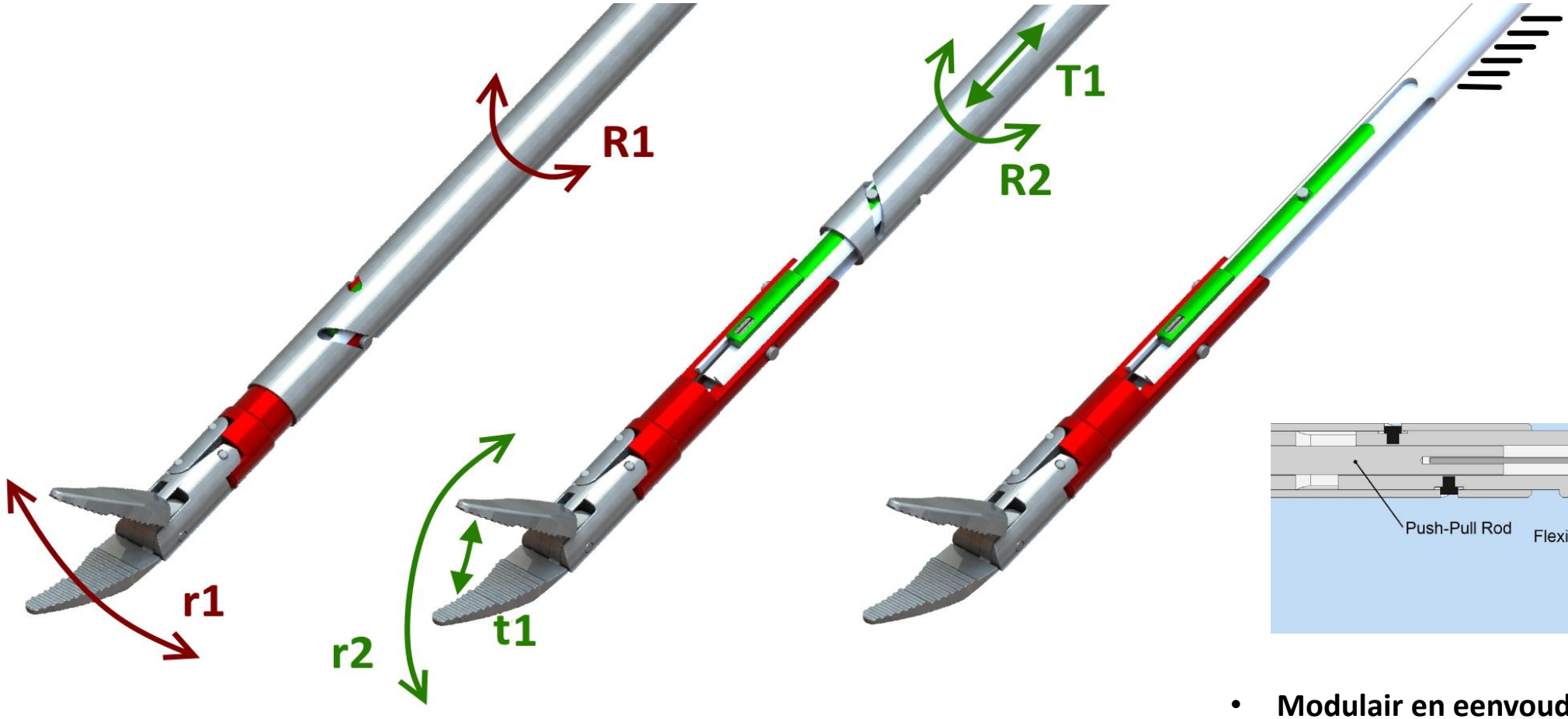
TU Delft

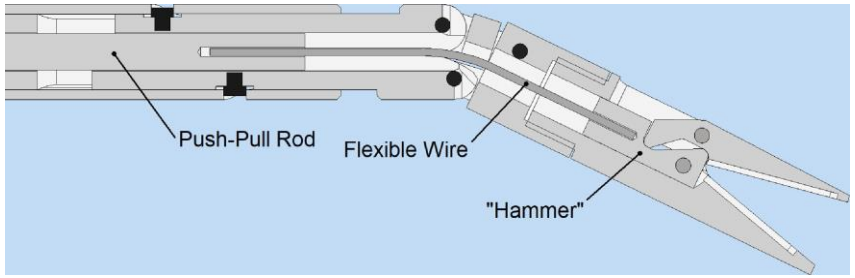




Duurzaamheid & Kosten → Hergebruik

TU Delft

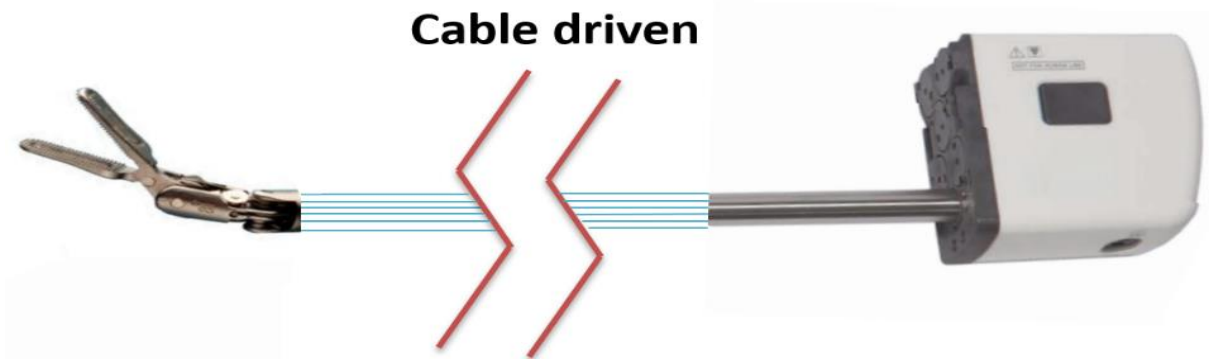




- **Modulair en eenvoudig in onderhoud**
- **Uitwisselbare instrumenten en gearbox onderdelen**

SATA laparoscopische instrumenten

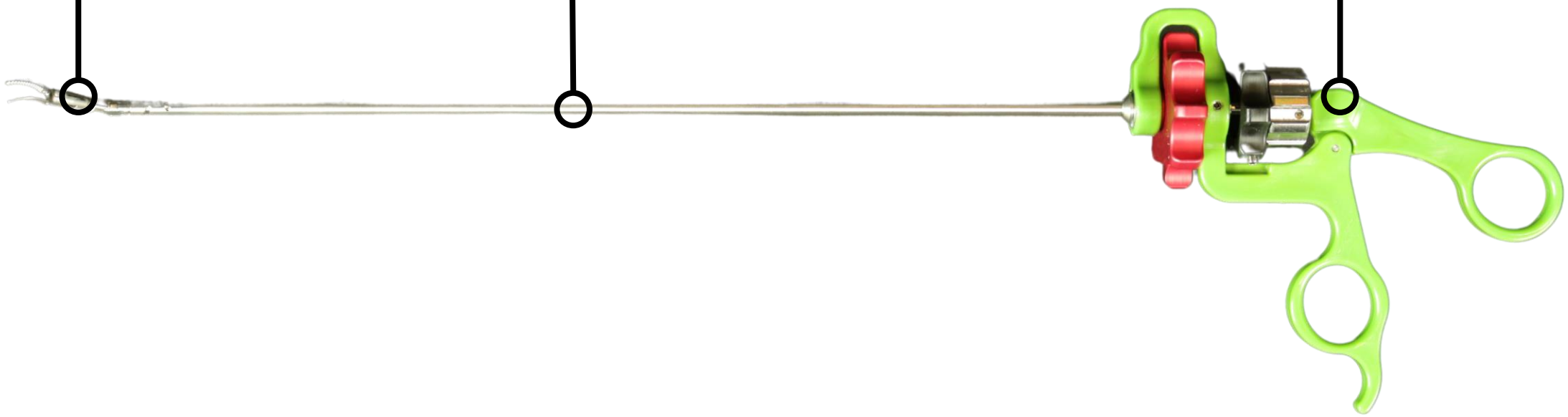
TU Delft



Exchangeable end-effector

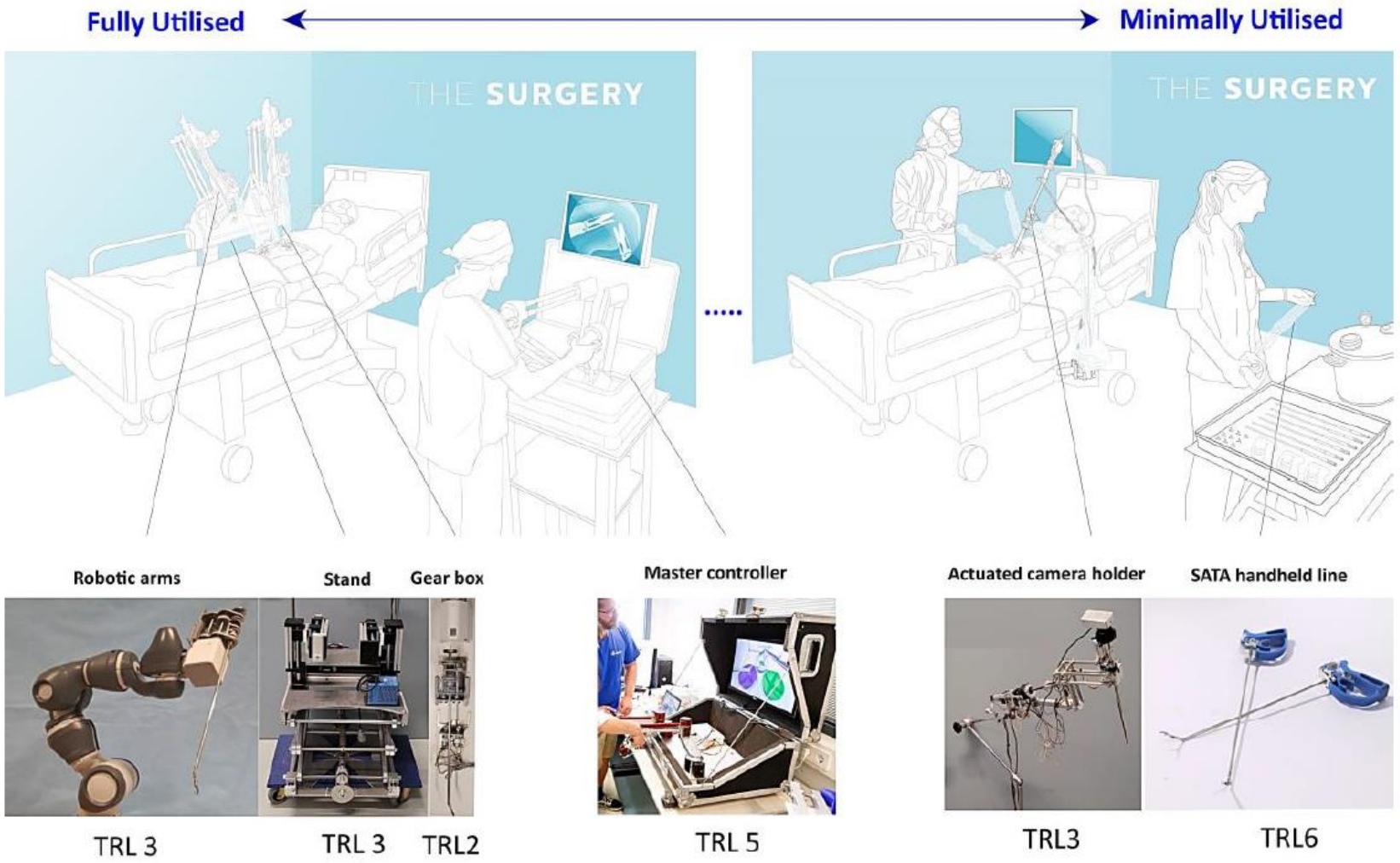
Detachable shafts

Reusable handle



SATA laparoscopische instrumenten is het duurzame alternatief

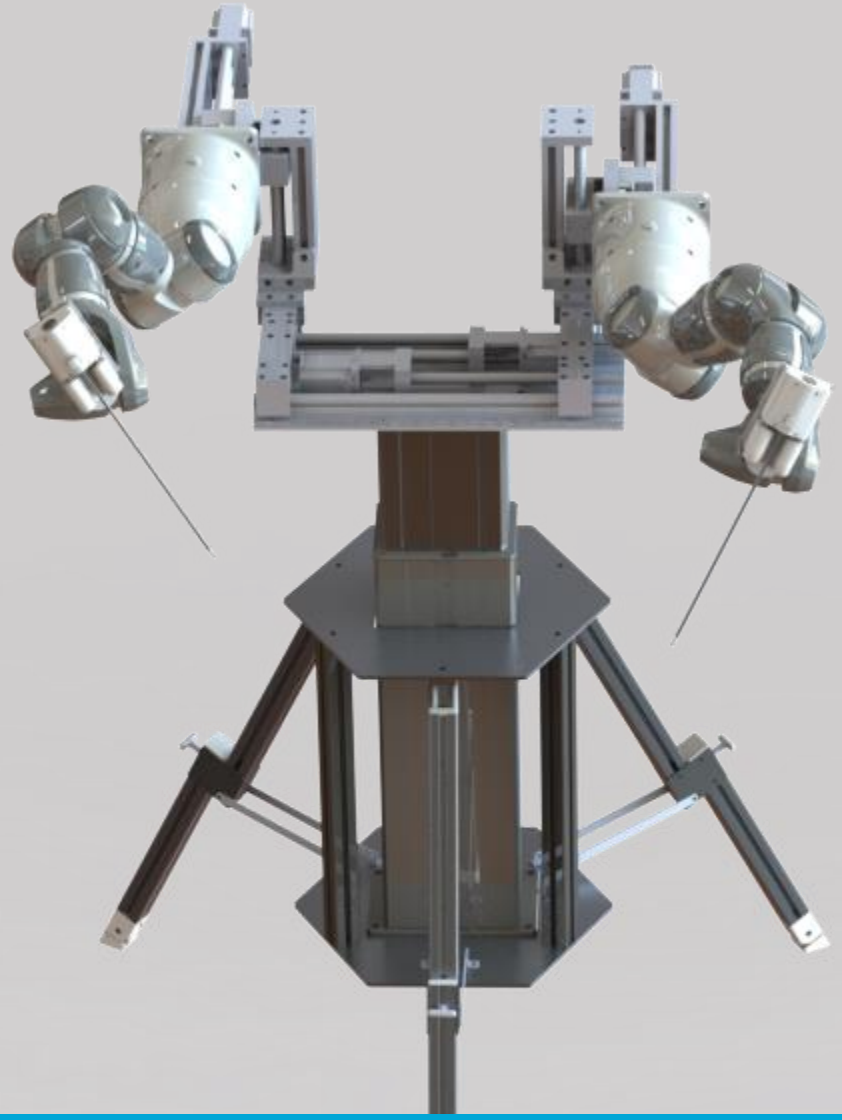
TU Delft



Veelzijdigheid ADLAP-RS systeem

TU Delft

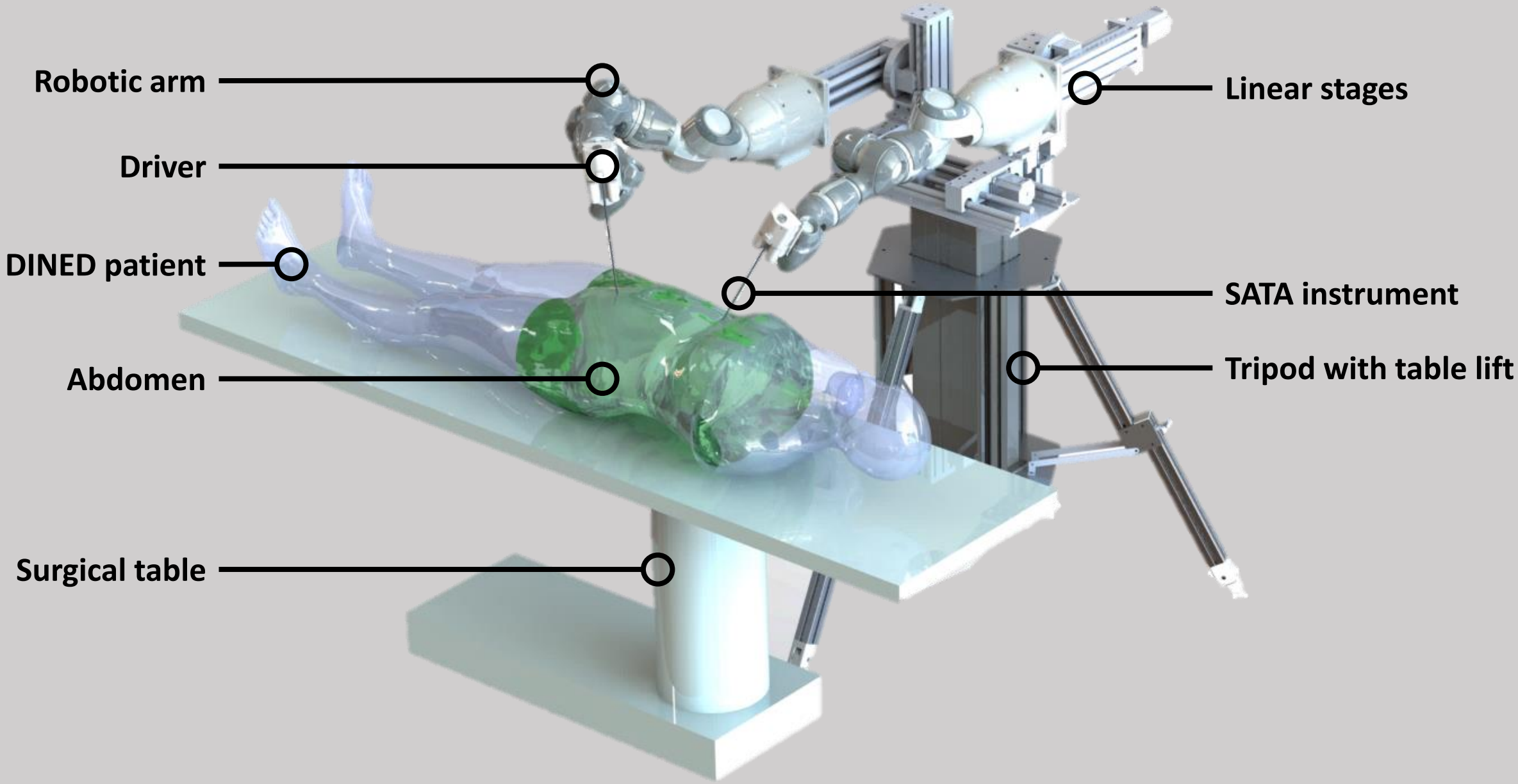
Forbes, 2019



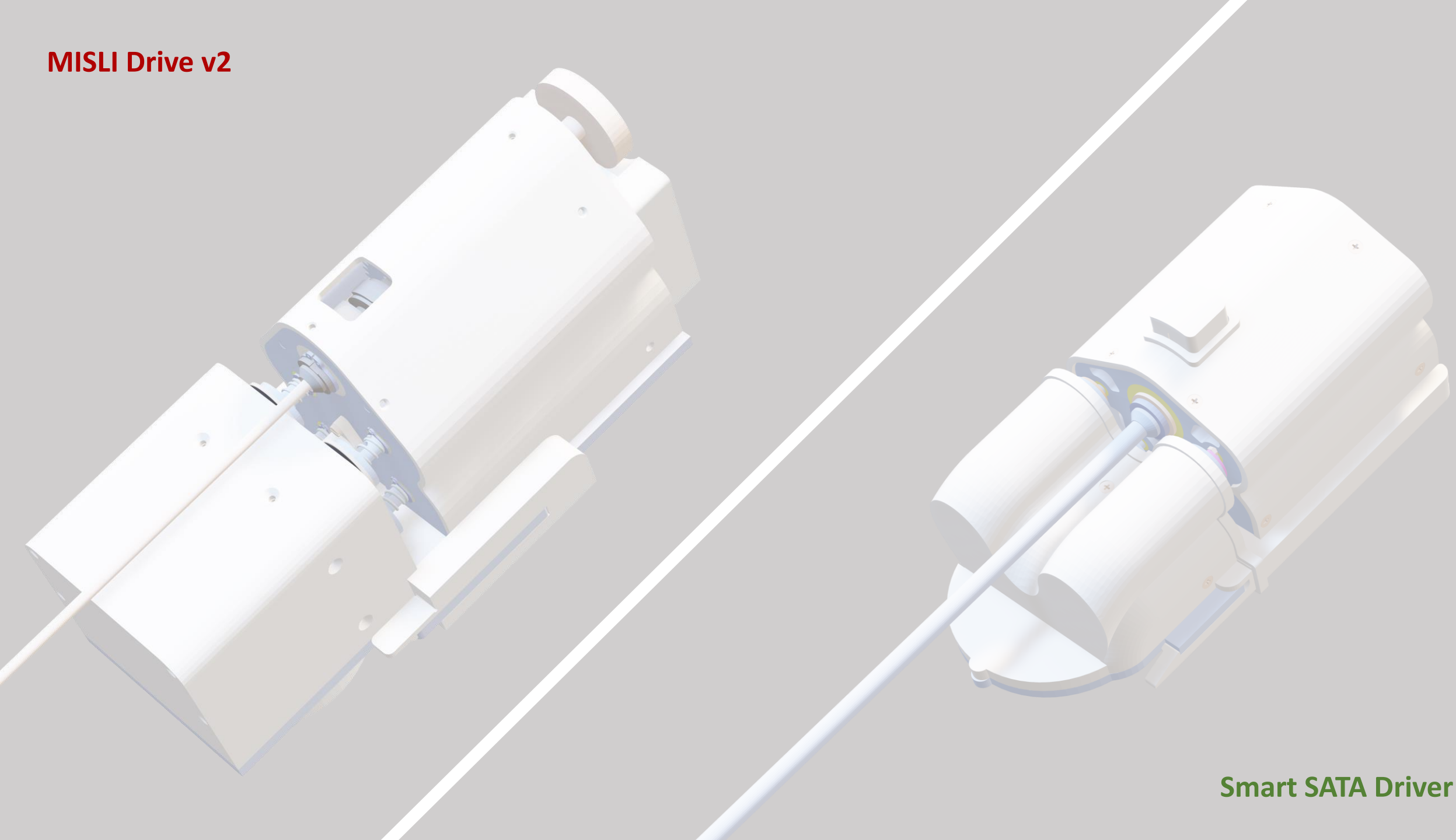
ADLAP Robot Platform

TU Delft

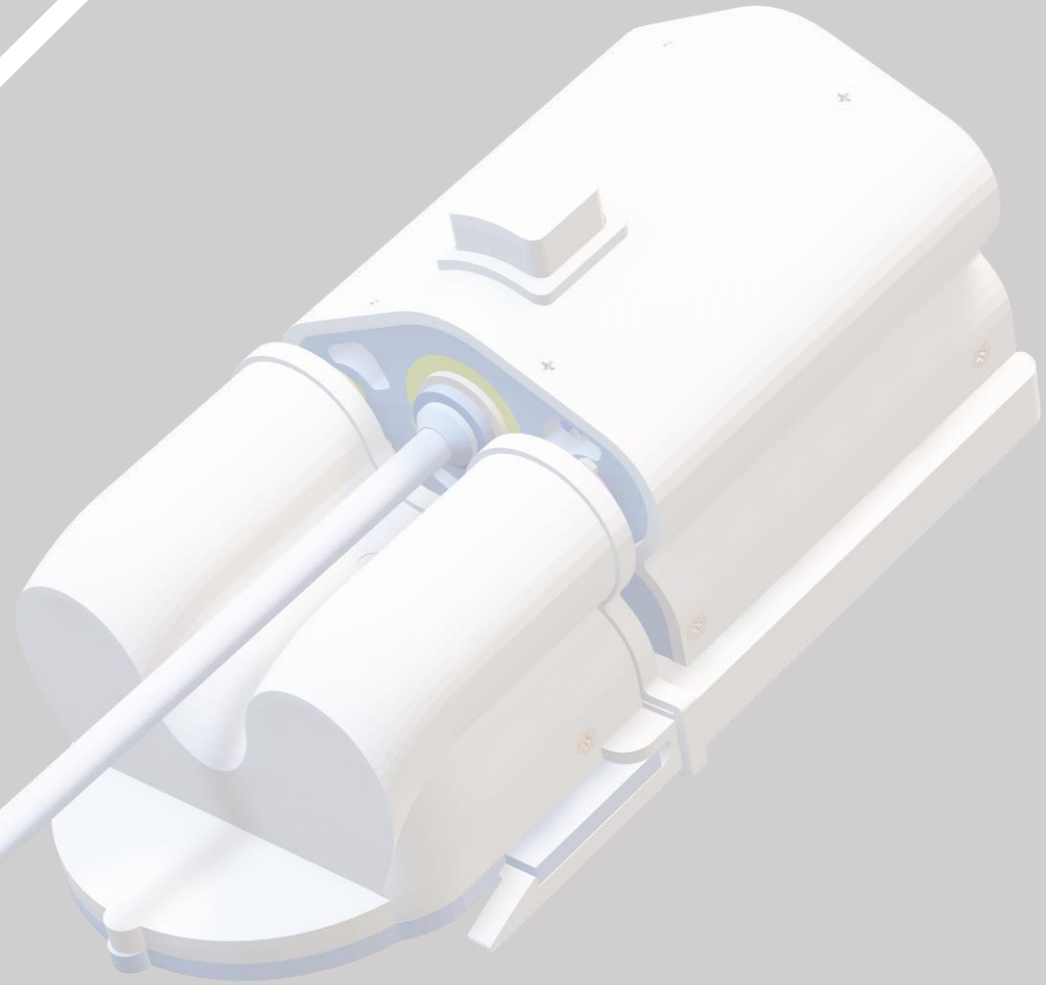
ADLAP Robotic System



MISLI Drive v2

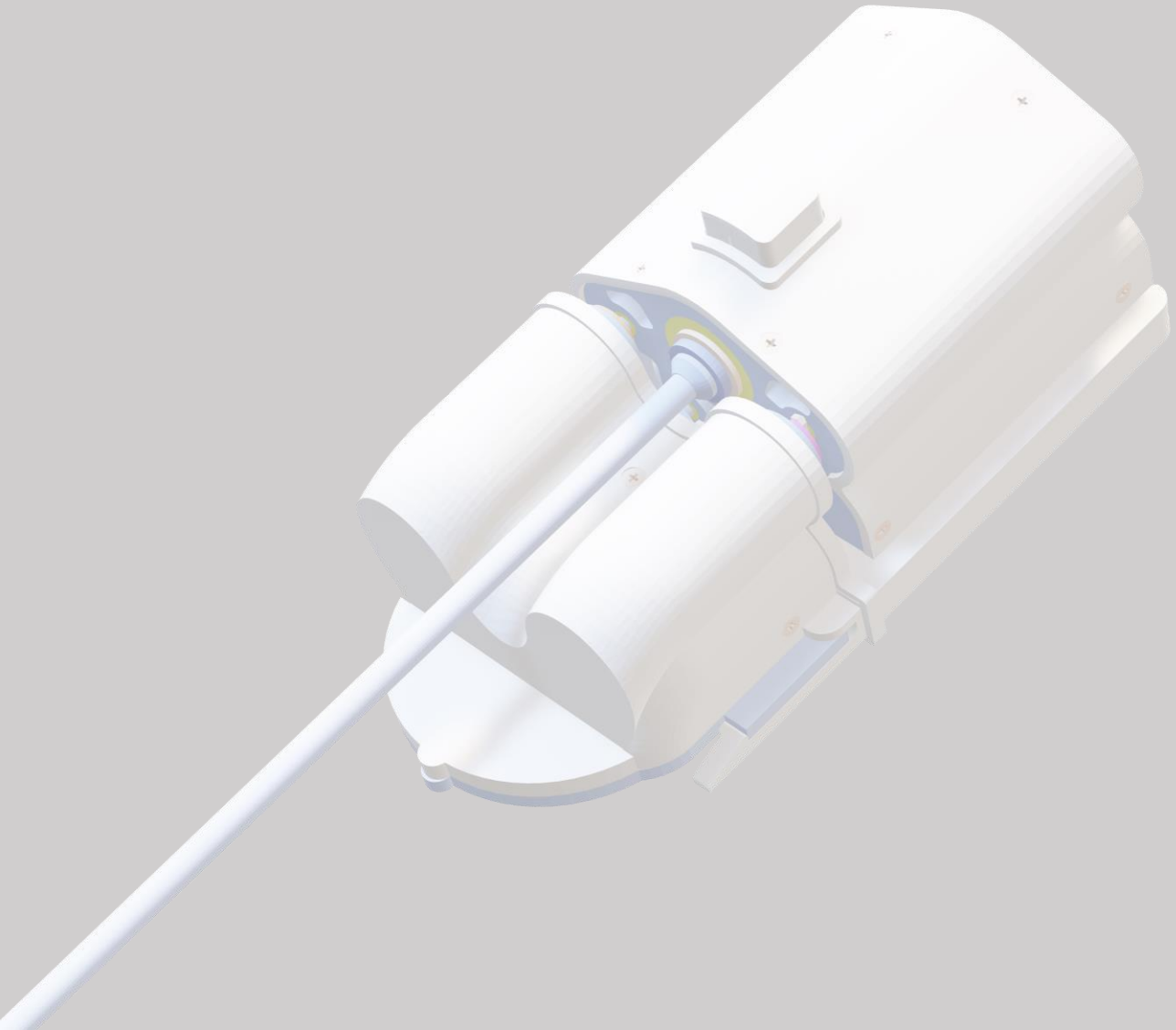


Smart SATA Driver



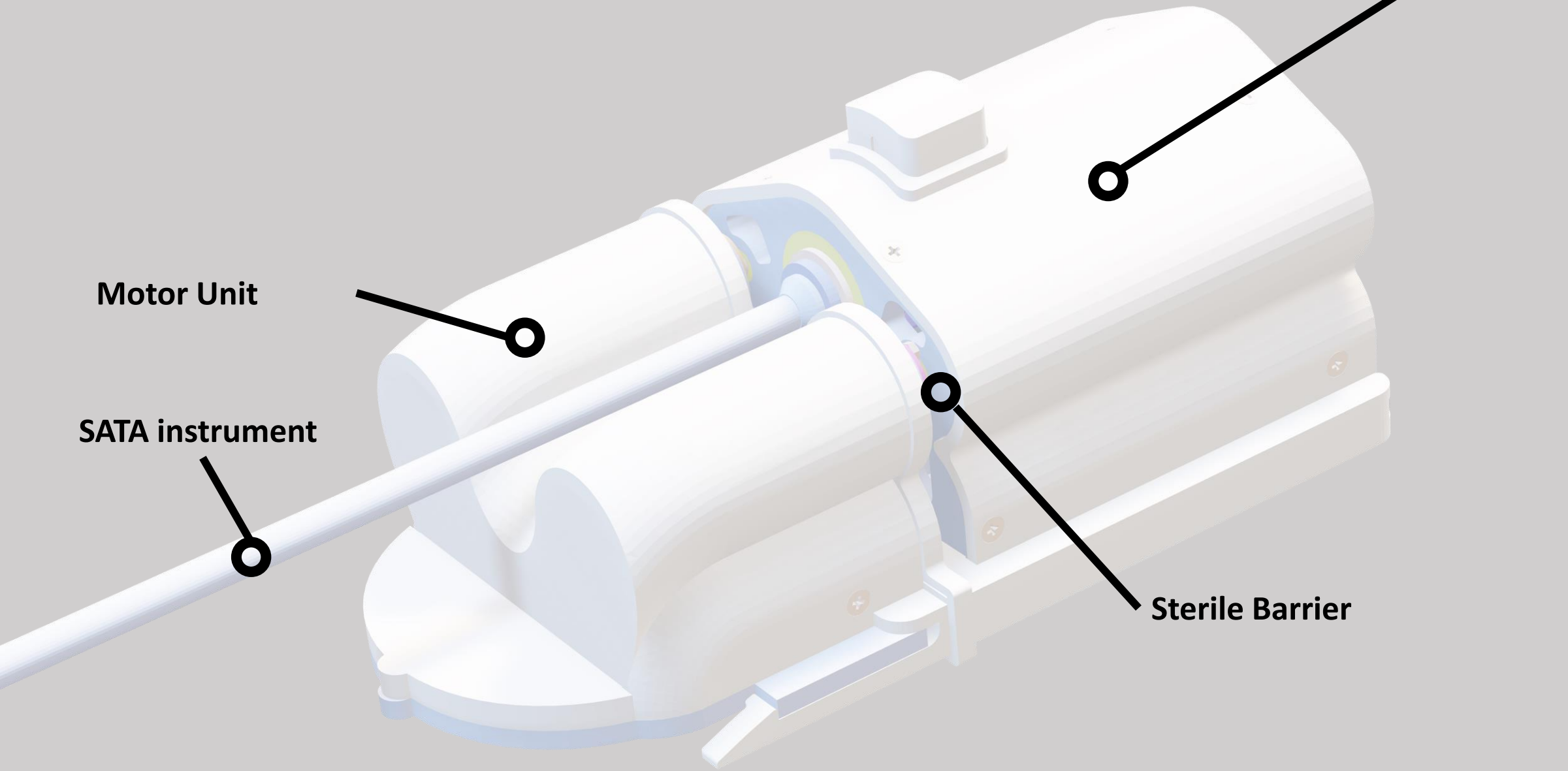
Smart SATA Driver

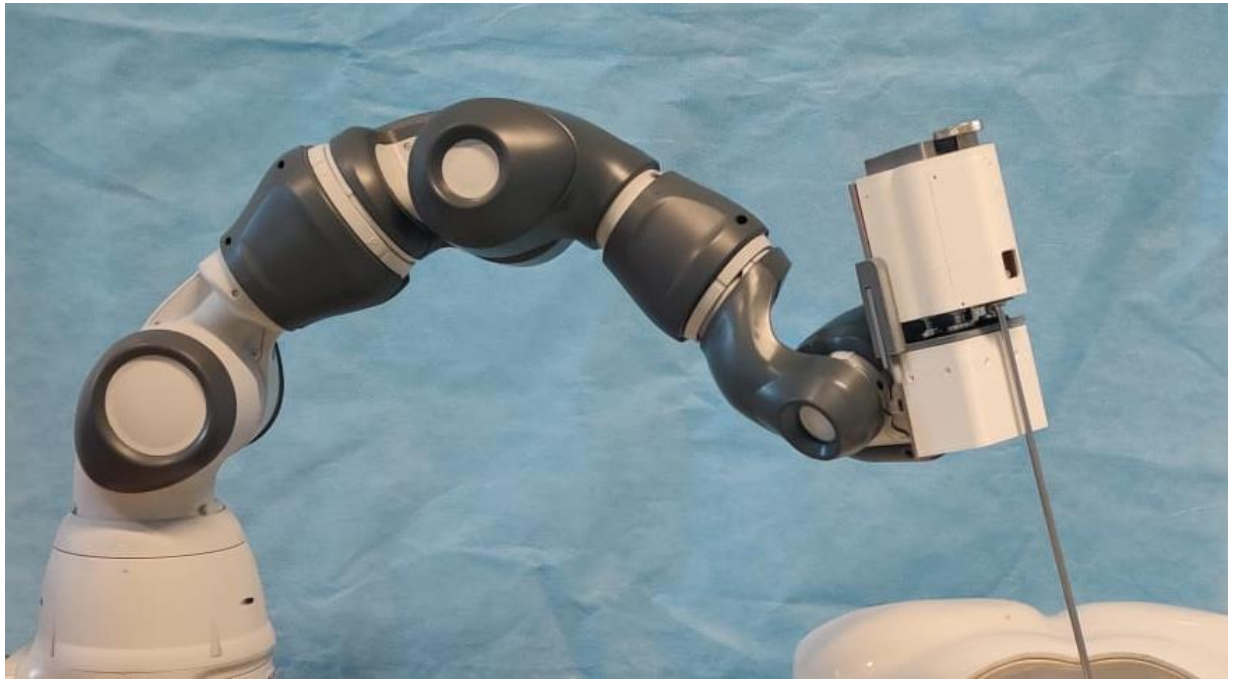
Smart SATA Driver

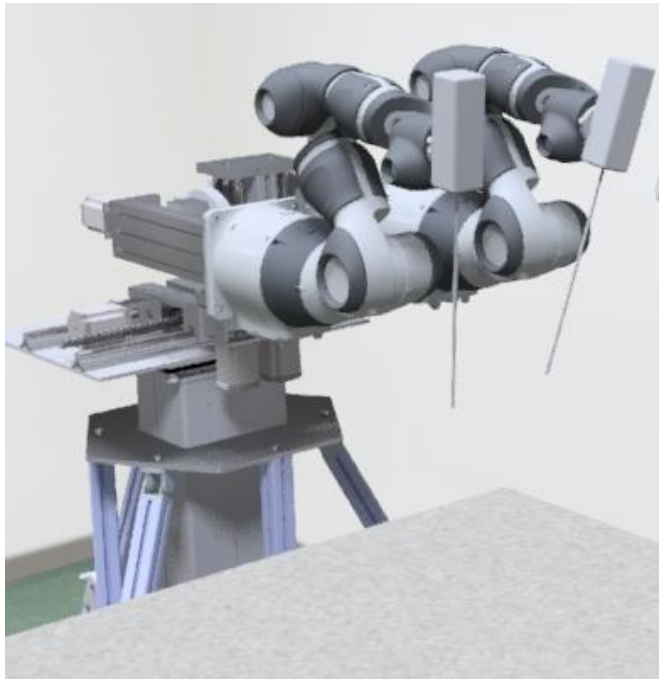


- COMPACT DESIGN (60% VOLUME REDUCTION)
- LIGHT-WEIGHT (50% MASS REDUCTION)
- BACKWARD DECOUPLING INSTRUMENT EXCHANGE
- SENSORLESS SENSING (USING STALLGUARD TECHNOLOGY)

Smart SATA Driver







VAN STRATEN MEDICAL
'Providing Value To Life'

tecnalia
MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE

ASENSUS SURGICAL

LUMC

CSA Services

Reinier de Graaf

ZonMw

Amsterdam UMC
Universitair Medische Centra

ASC

TU Delft

DEMCON

INOVY CONSULTING

MediShield

ADLAP RS

TU Delft