AI model to determine whether dialysis vascular access requires intervention

Changhua Christian Hospital, TAIWAN

May 8~9, 2025

@Tokyo International Forum (TIF) Glass Building Lobby Gallery

Purpose

Vascular access

Artery — Vein

Arteriovenous graft
人工血管廔管

Hemodialysis
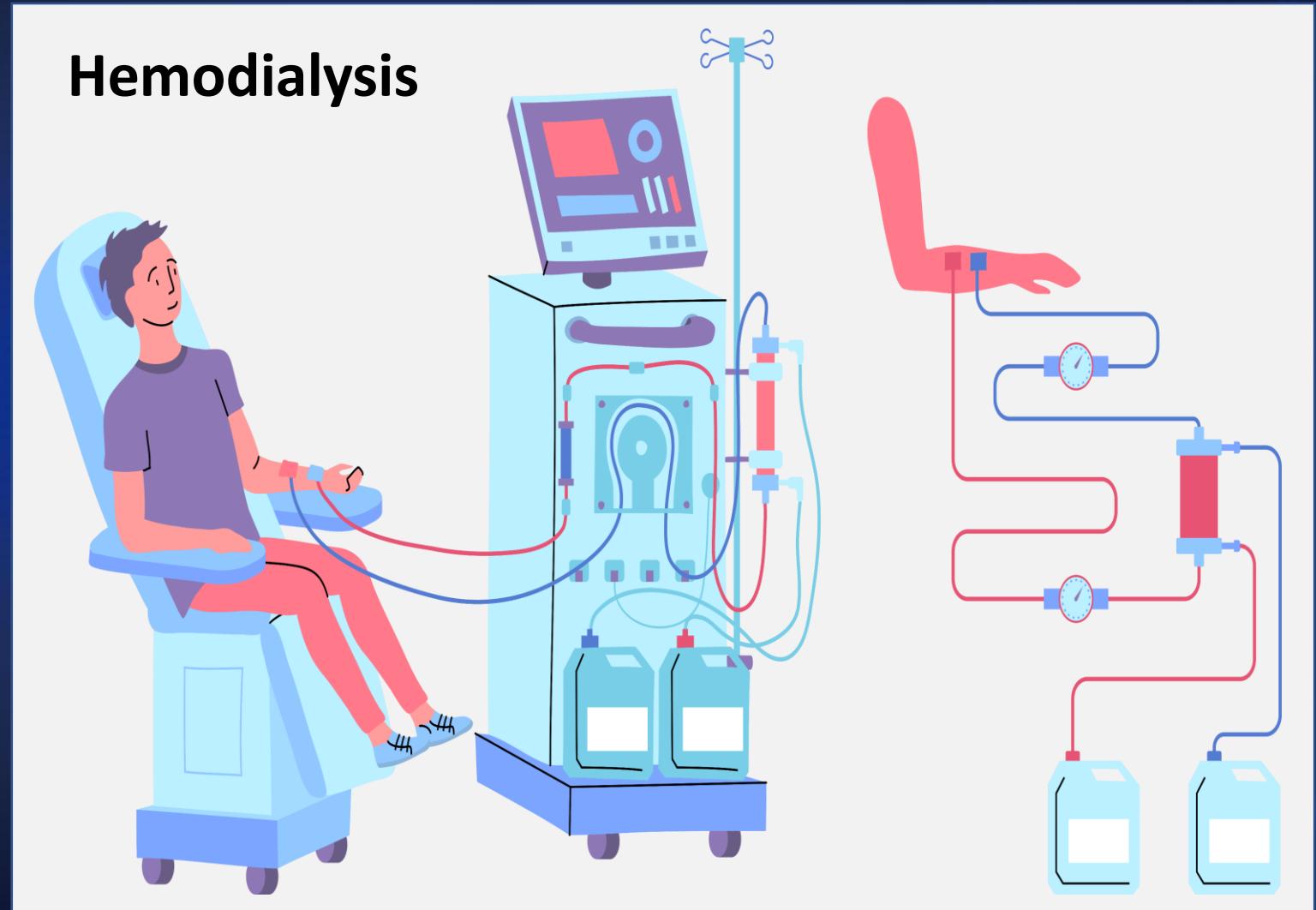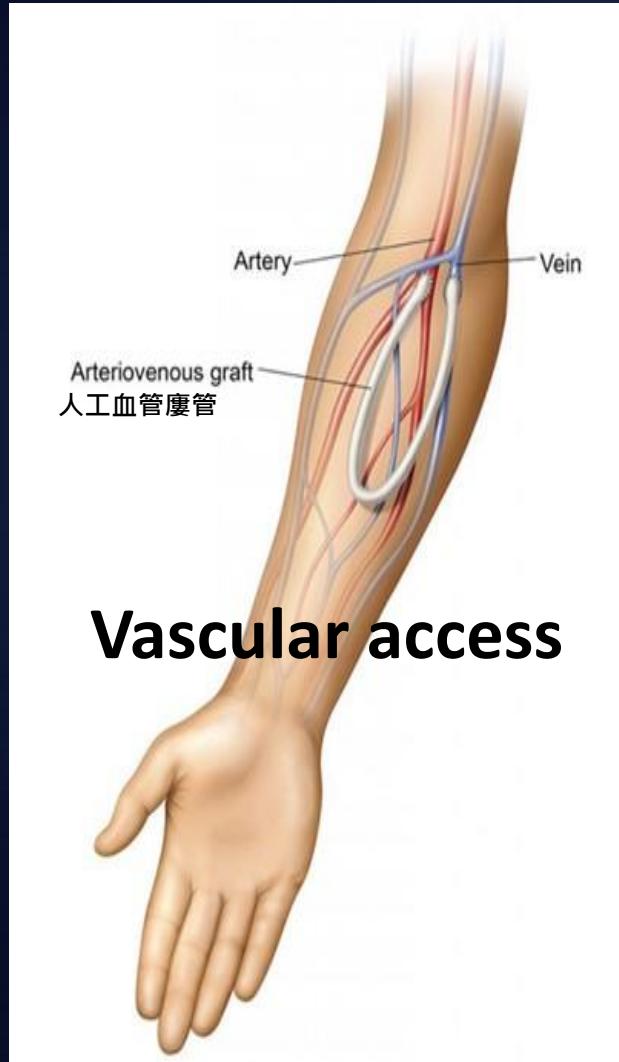
Determination of vascular access function

Physical examination

The patient is routinely checked for tremor or rustling during vascular assessment <mark>before</mark> dialysis.

Surveillance

Nurses observe blood flow rate setting and venous pressure changes <mark>during</mark> dialysis.

Current Challenges

Traditional methods involve using hardware devices to measure sound, flow rate, or images, which are costly, time-consuming, and require additional manpower.

The process of dialysis service

1. Check-in and pre-dialysis measurements
2. Patient management and assessment
3. Dialysis prescription setting
4. Perform dialysis and record
5. Post-dialysis measurements
6. Dialysis report

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Proposed Solution

An artificial intelligence (AI) model is trained to read data from the dialyzer and physiological parameters to assist in determining the need for intervention.

Data Analysis

Training Data: Collected from 121 patients, totaling 2,852 records.

AI Model Variables:
   systolic blood pressure, diastolic blood pressure, heart rate, respiration rate,
   blood flow rate and venous pressure.

Four models trained using 5-fold cross-validation.

The predictive power of each model	XGBoost	Random Forest	adaboost	Voting
Sensitivity	0.832	**0.888**	0.843	0.863
Specificity	**0.606**	0.550	0.599	0.583
Accuracy	0.752	**0.769**	0.757	0.764
Area Under Curve	0.771	**0.79**	0.777	0.784

"Predicting vascular access efficiency with every dialysis session's data!"

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AI Model

Confirm/ Retraining
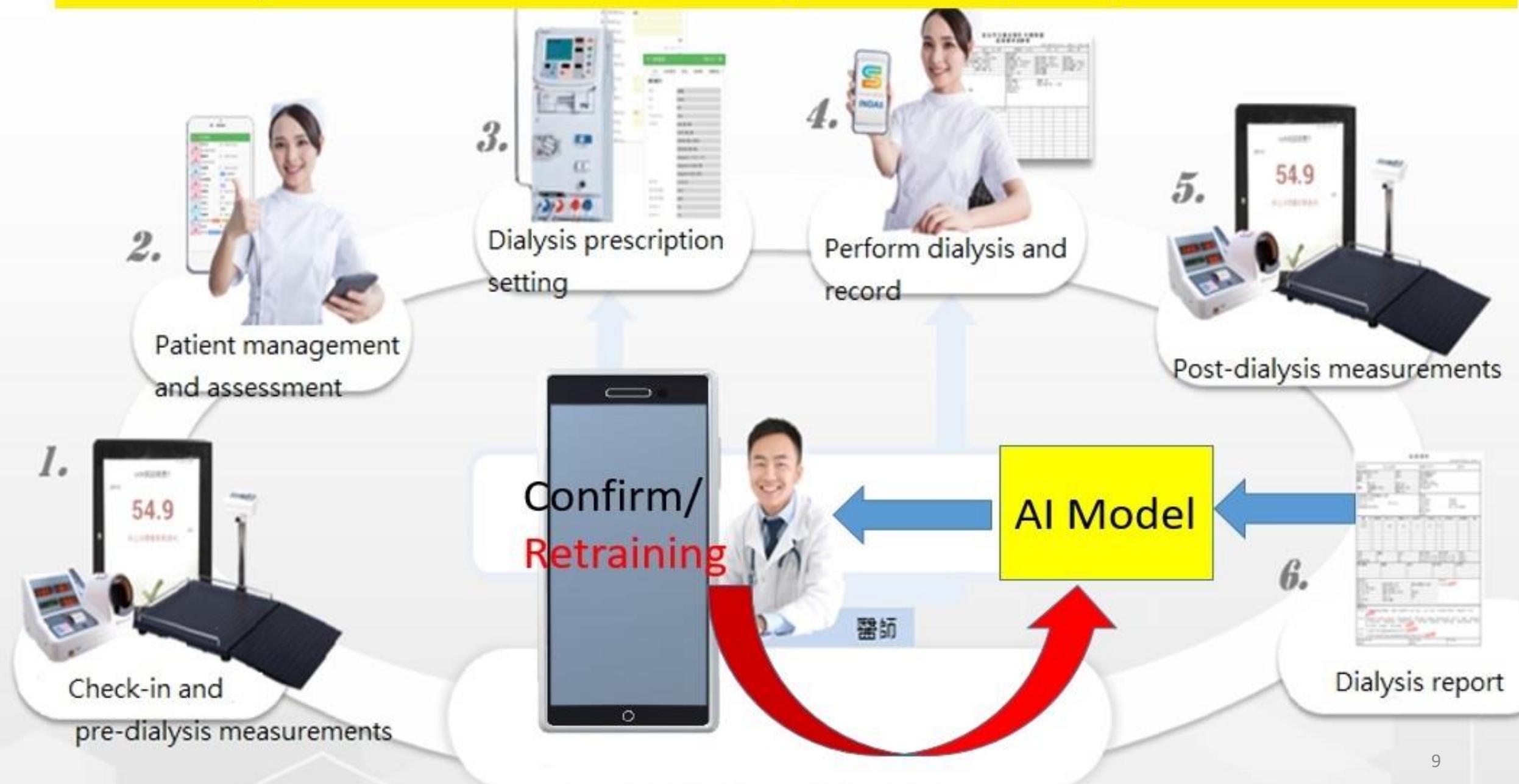
Advantages of applying the AI model
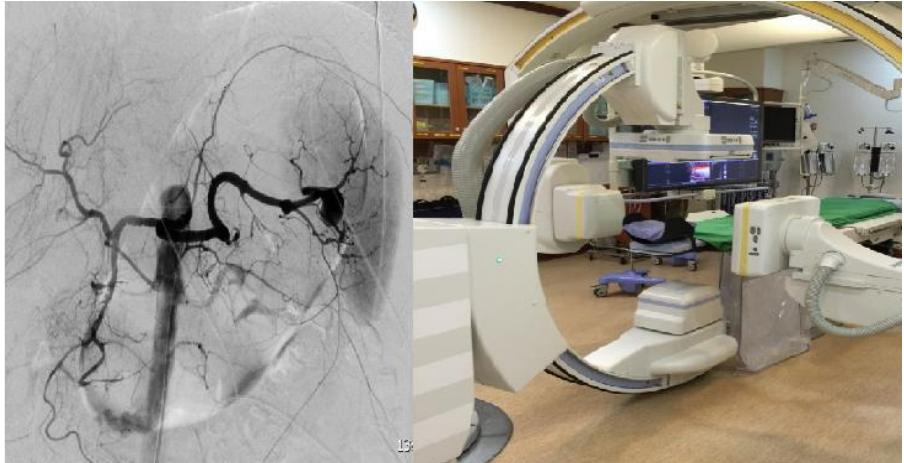
Angiography

Sonography

Acquisition cost

Operating manpower

Space

Time
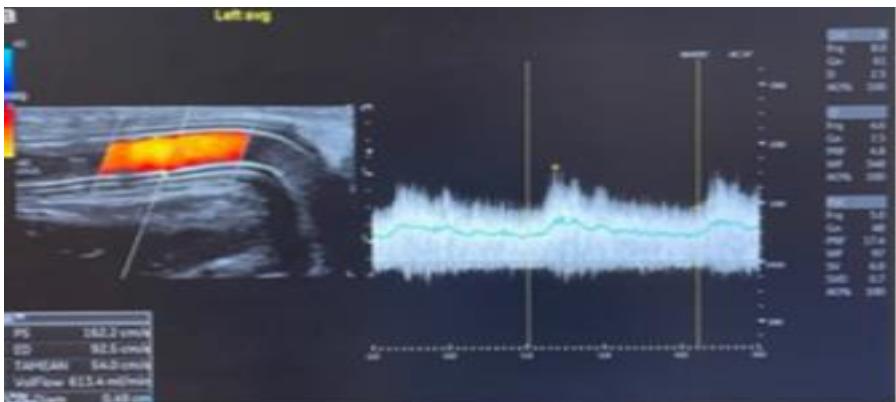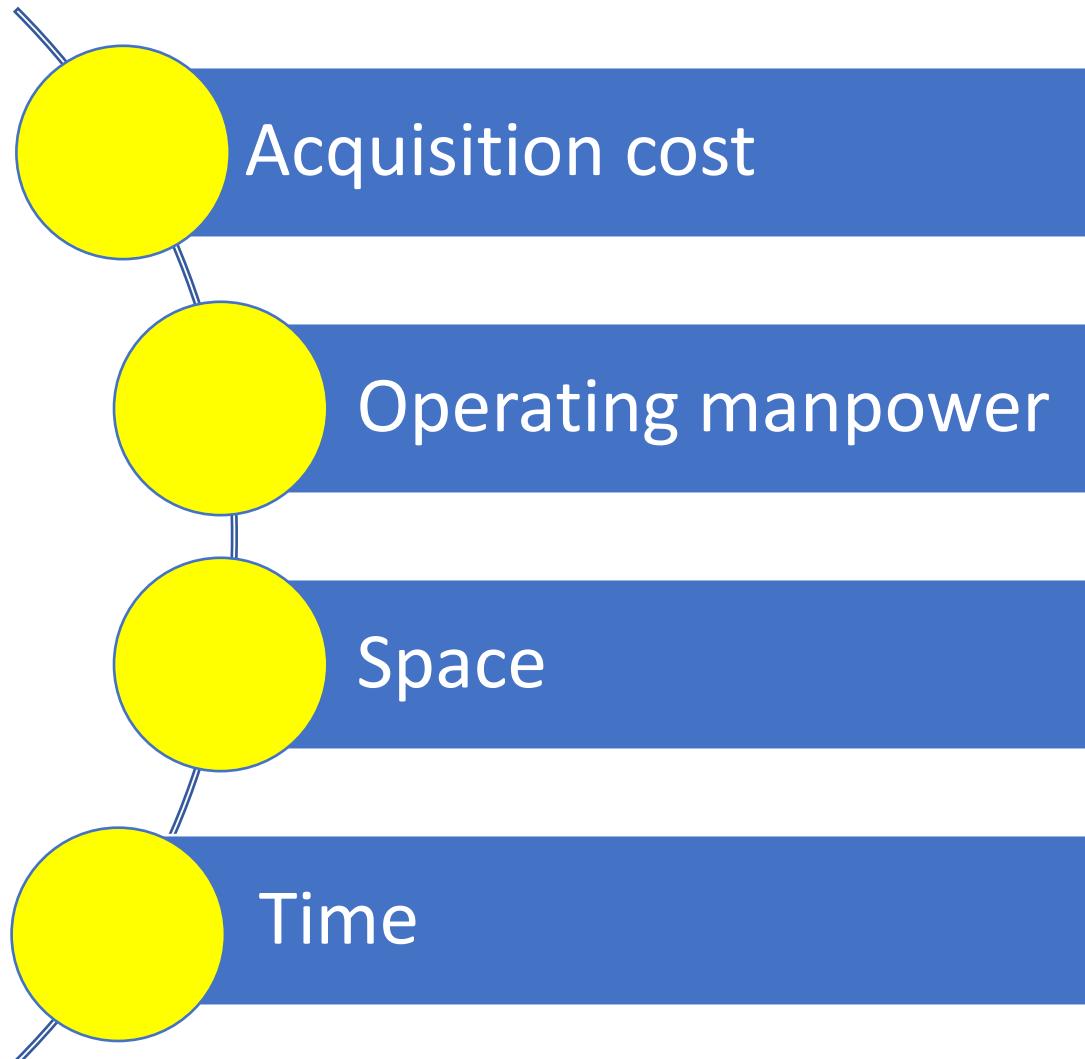
The Gold Medal Award

Thank you for listening