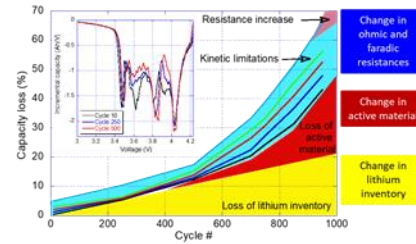


Hawaii Natural Energy Institute Battery activity 2018

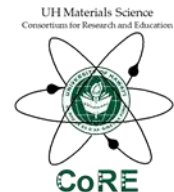
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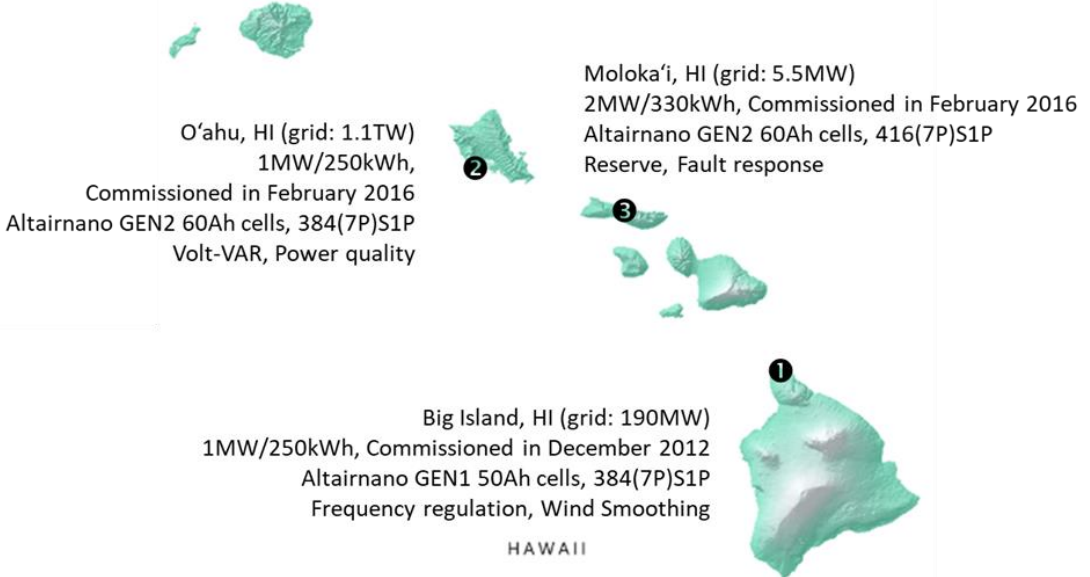


HNEI battery testing laboratory

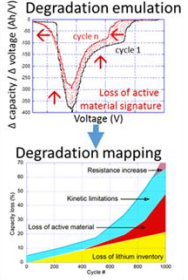
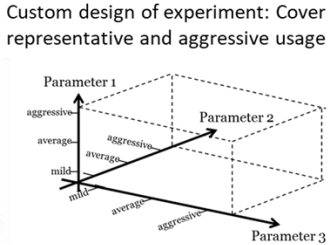
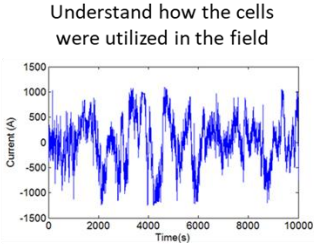
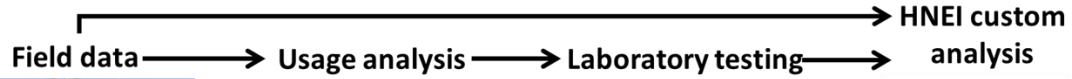
Recent focus on batteries for storage, grid-tied

Grid-tied Storage

Monitoring of 3 grid-tied systems ($\geq 1\text{MW}$)



Laboratory testing of single cells (similar to the one in large batteries)
> 80 battery tested under different conditions



HNEI battery testing laboratory

Recent focus on batteries for storage, grid-tied or in vehicles

Grid-tied Storage

Monitoring of 3 grid-tied systems
($\geq 1\text{MW}$)



Laboratory testing of single cells
(similar to the one in large batteries)
> 80 battery tested under different conditions



Vehicle Storage

Study impact of vehicle to grid
usage on EV battery degradation



Laboratory testing of single cells
(similar to the one in EVs)
> 80 battery tested under different conditions



The complexity of battery diagnosis

Path dependence of the degradation

Traffic



Road type



Driving habits



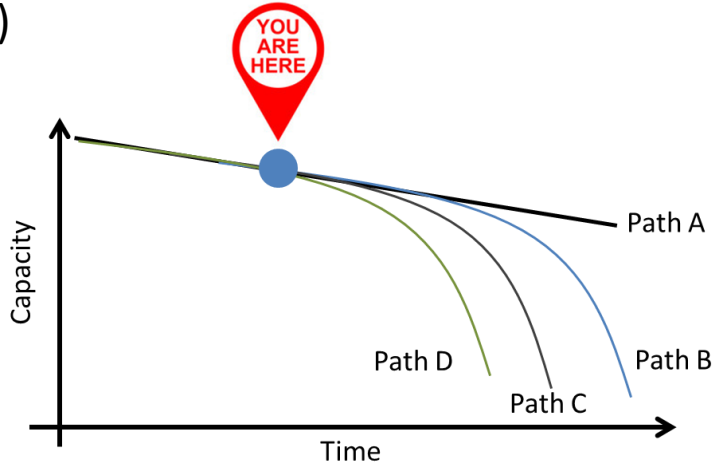
Charging habits



Temperature



Grid ties (V2G / G2V)



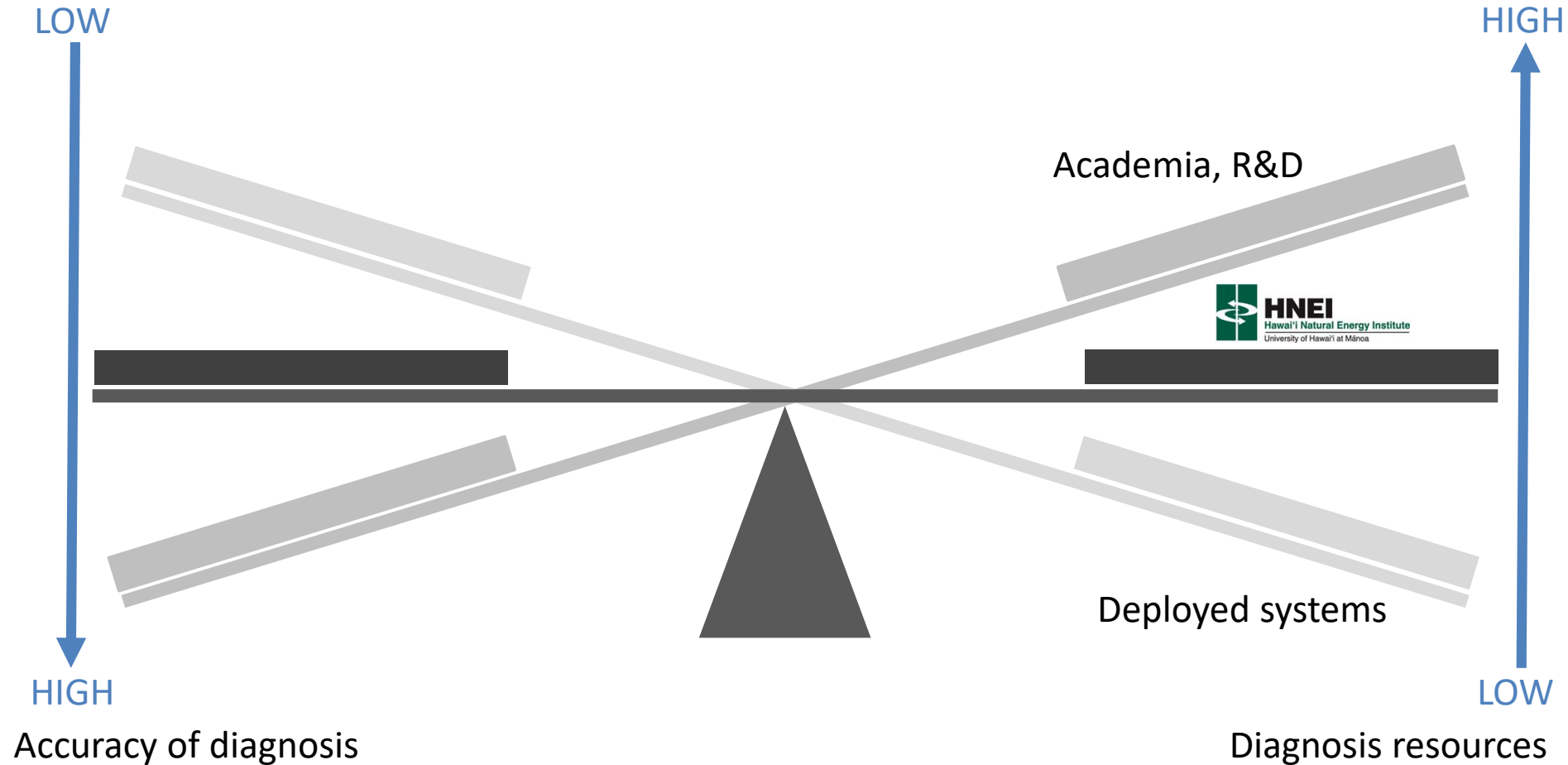
Different paths will lead to different degradation

Every battery is different

HNEI developed accurate diagnosis using onboard parameters

The complexity of battery diagnosis

Complex balance



HNEI battery testing laboratory

Testing following rigorous protocols

Well defined performance metrics

Experience in experimental design

Operando Diagnosis and prognosis

Non destructive analysis

Online SOC and SOH monitoring

New methodologies for deployed systems

BESS modeling

Account for cell-to-cell variations

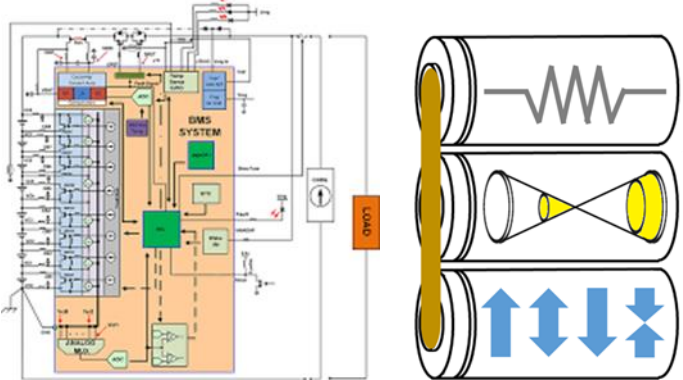
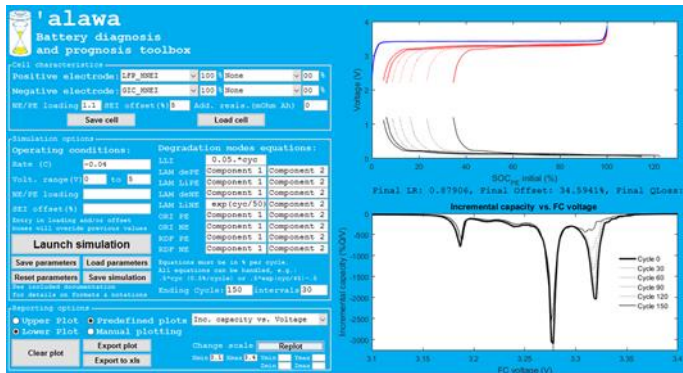
Transfer knowledge from single cell to packs

Applications to commercial batteries

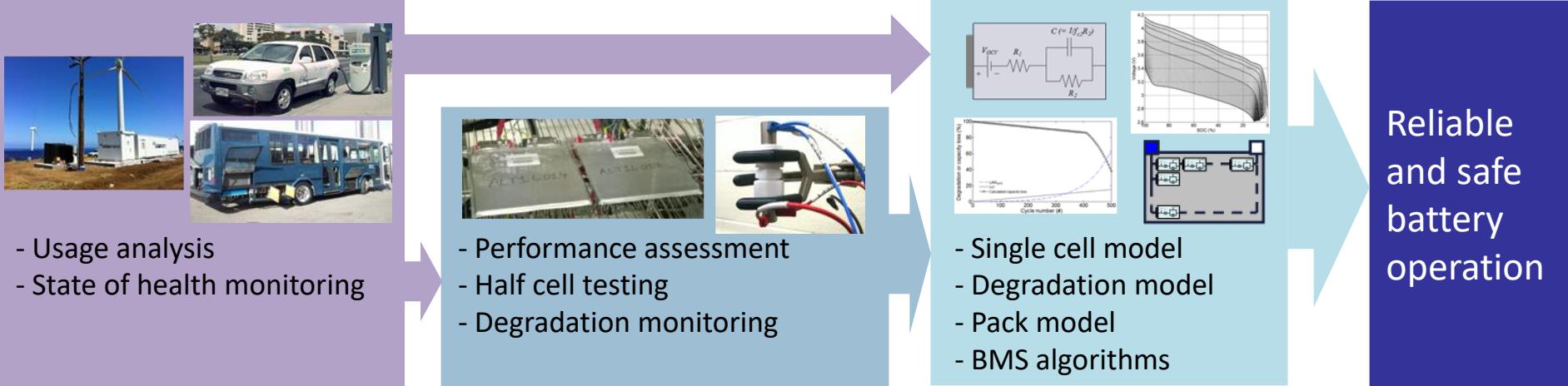
BESS

V2X / X2V

Second use, Recycling (To be started)



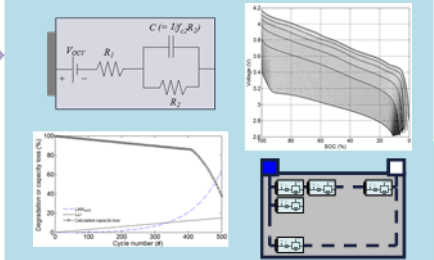
HNEI Battery activity



- Usage analysis
- State of health monitoring



- Performance assessment
- Half cell testing
- Degradation monitoring



- Single cell model
- Degradation model
- Pack model
- BMS algorithms

Reliable and safe battery operation

Field Testing

Laboratory Testing

Modeling

Funding



Collaborations

