

Planning for AI (with AI?)

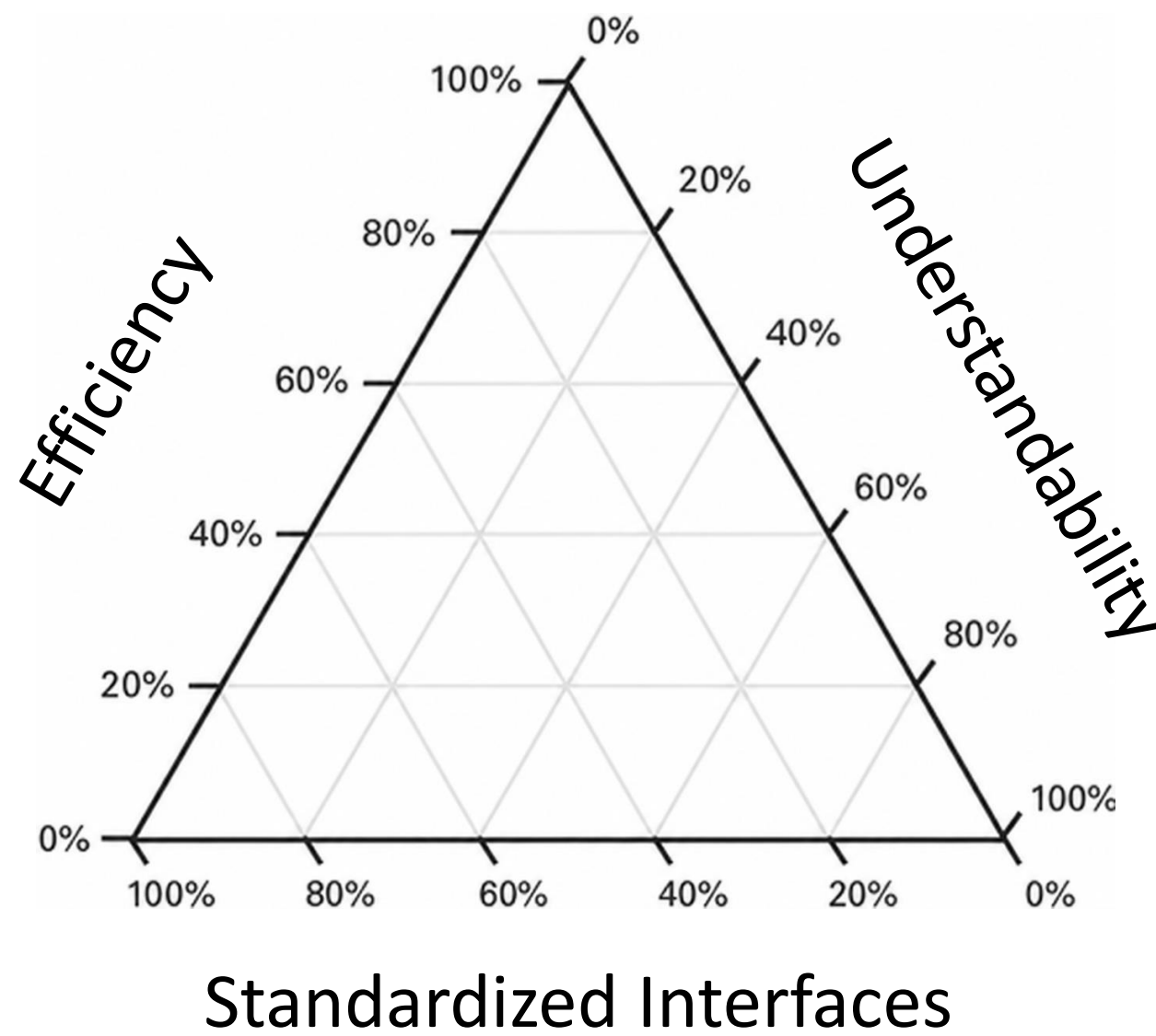
EPRI's 45th Annual Seminar on Resource Planning for
Electric Power Systems - 2026



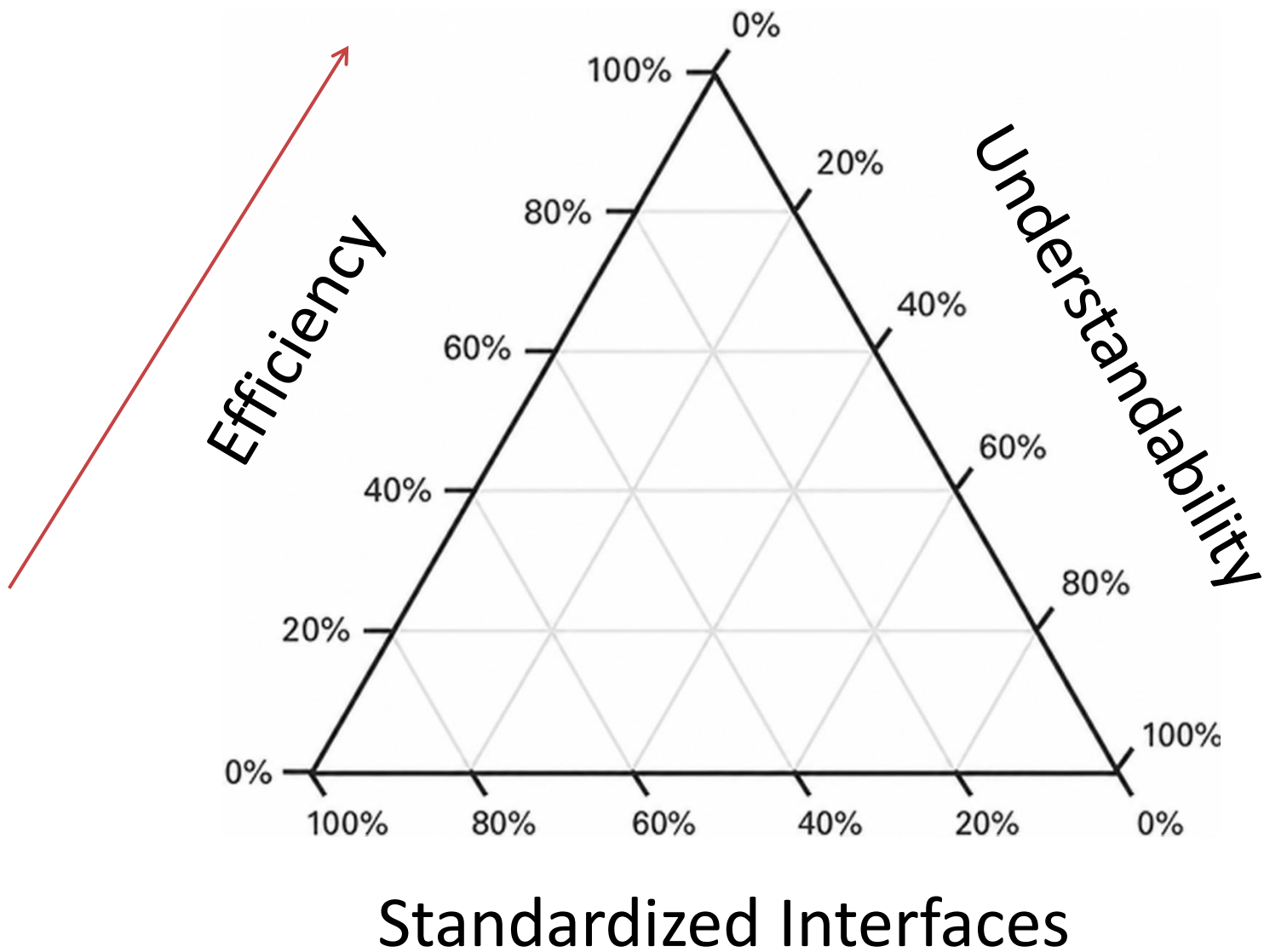
Dheepak Krishnamurthy
Technical Leader

Sep 3rd, 2026

Key Insights in three categories



Key Insights in three categories

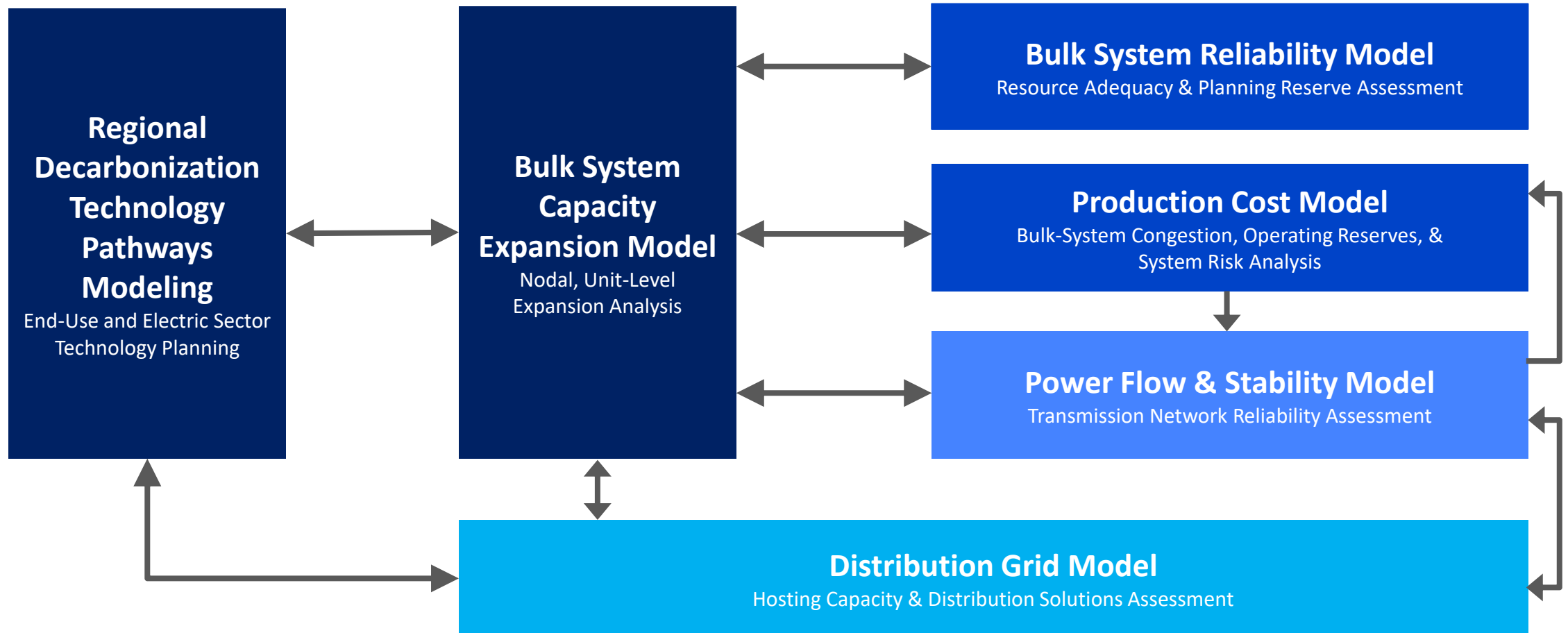


ISSP Analytical Framework & Modeling Toolbox

Scenario Development

Resource Portfolio Planning

System Cost & Reliability Evaluation

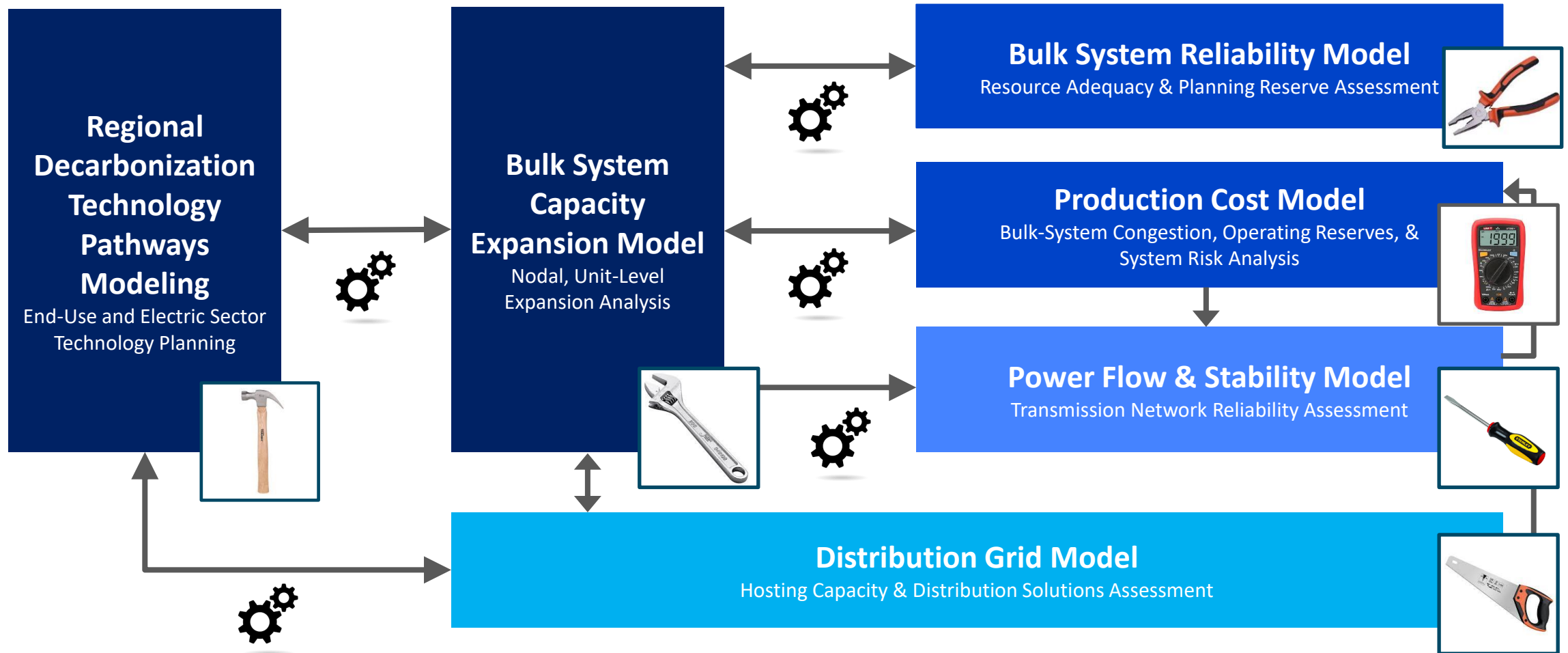


ISSP Analytical Framework & Modeling Toolbox

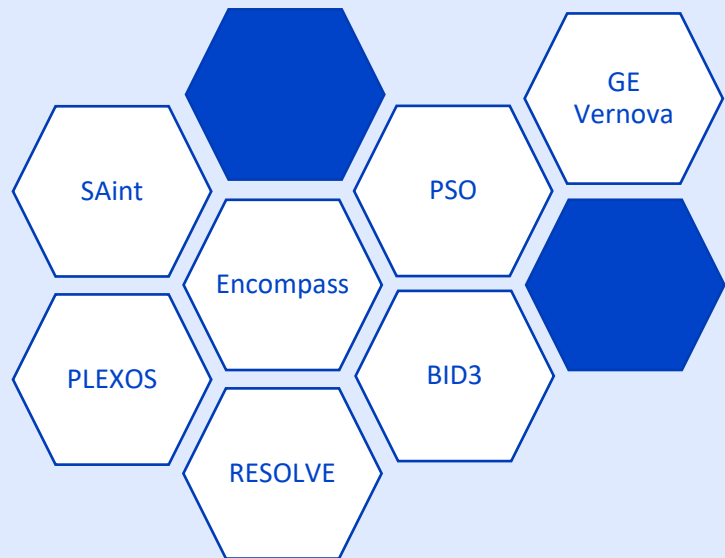
Scenario Development

Resource Portfolio Planning

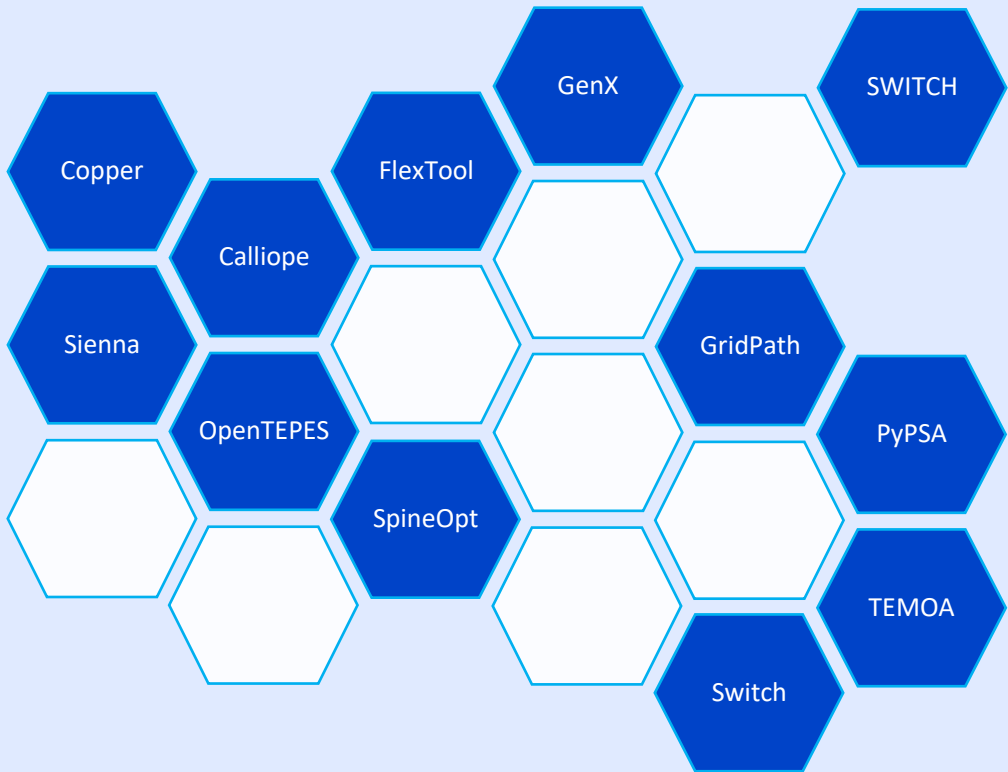
System Cost & Reliability Evaluation



Integrated Energy System Models

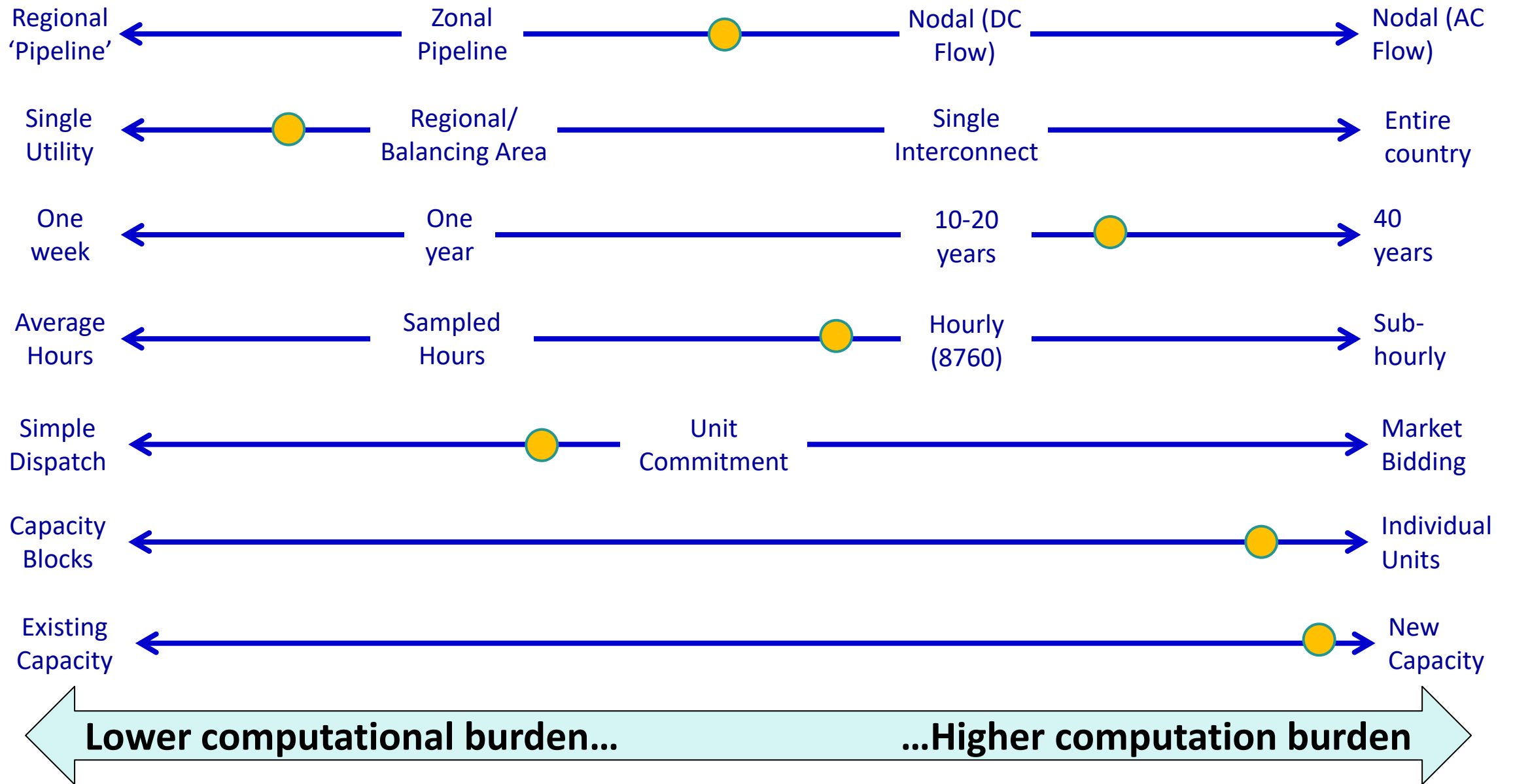


Commercial

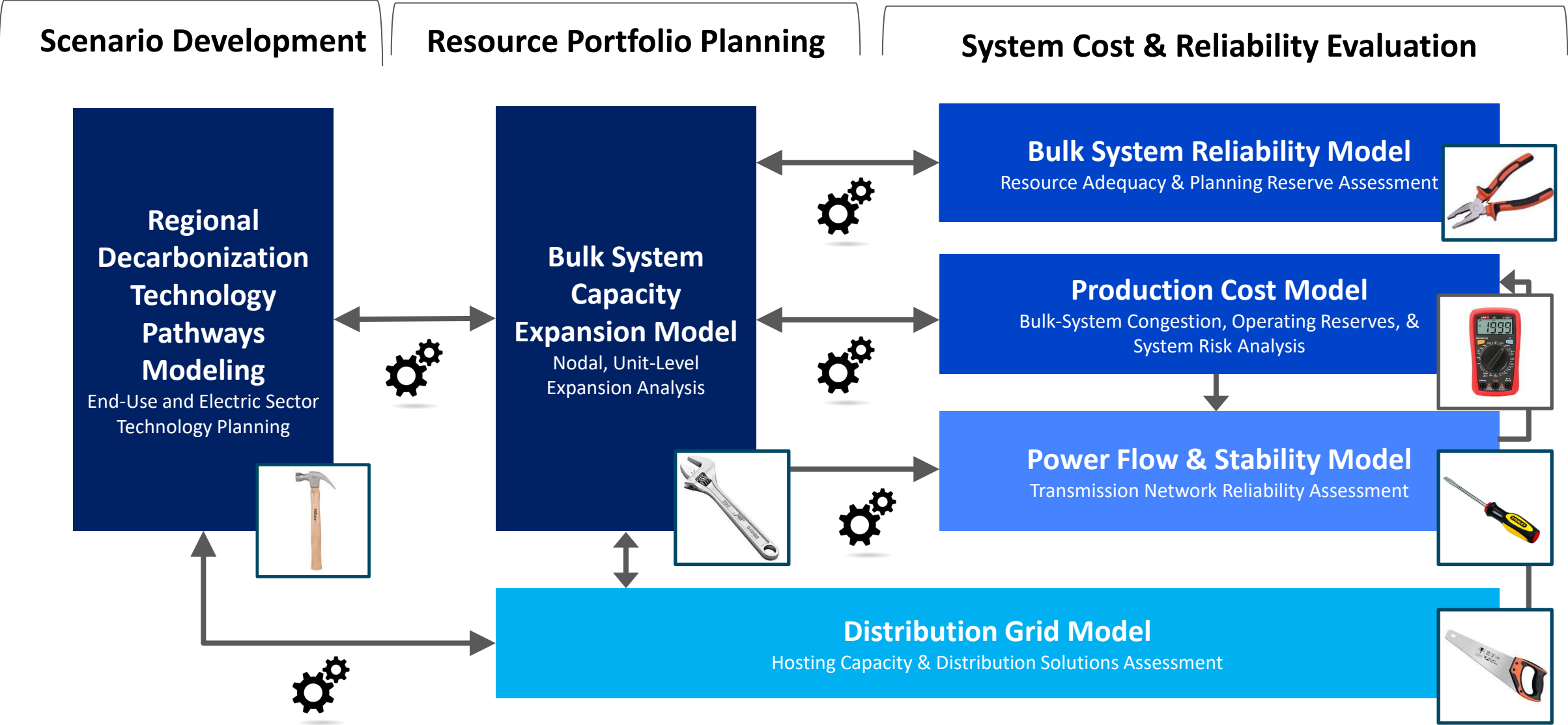


Open Source

Key Model Design Choices & Computational Tradeoffs...



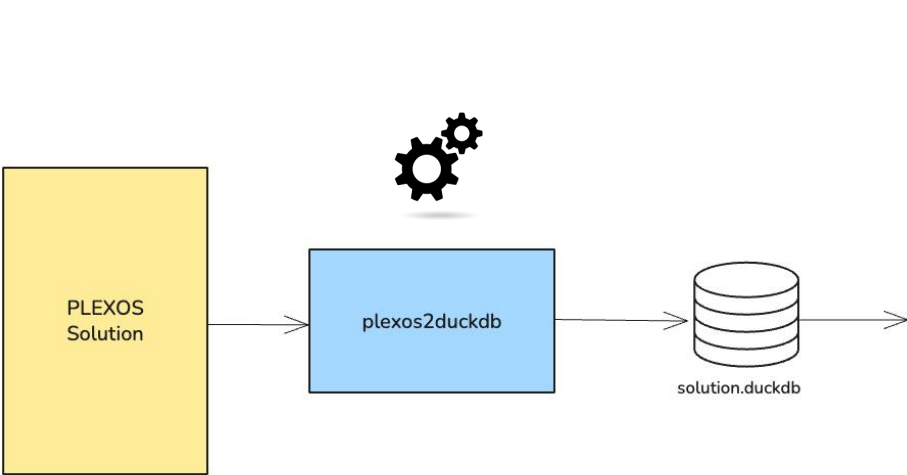
ISSP Analytical Framework & Modeling Toolbox



plexos2duckdb: Convert PLEXOS Solution Files to SQL DuckDB databases

plexos2duckdb is a software command line tool that converts PLEXOS solution files to SQL DuckDB databases for easy and fast post processing.

The initial release is available on GitHub



For Additional Information:

Dheepak Krishnamurthy

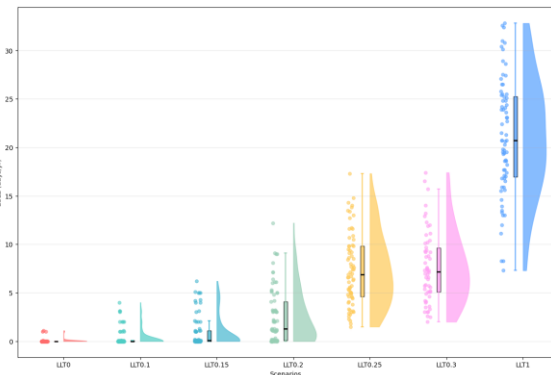
Technical Leader
Energy Systems and Climate Analysis

dkrishnamurthy@epri.com

Available on EPRI.com (beta)
Product ID: [3002033632](#)



Analysis Workflow



Search

Notebooks +

Analysis-Notebook

Attached databases +

Model-DAY_AHEAD-Solution

data

main

processed

raw

report

Analysis-Notebook

Model-DAY_AHEAD-Solution

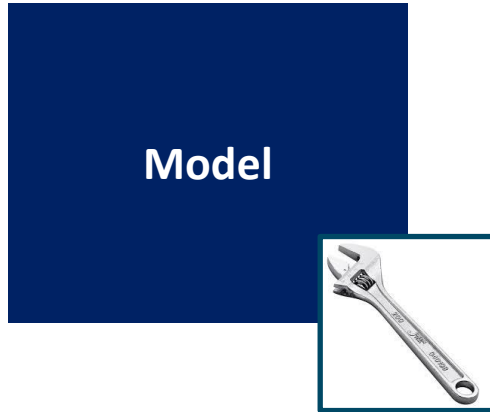
FROM report.ST_Year_Generators_Generation SELECT *

158 rows returned in 20ms

id	band	T	sample_name	T_name	T_category	timestamp	lat	interval_length	# Generation
1	1	NULL	212_CSP_1	CSP	2020-12-31 07:00:00			1	0.1753331657200000
2	1	NULL	101_STEAM_3	Coal	2020-12-31 07:00:00			1	2.6835641499999999
3	1	NULL	101_STEAM_4	Coal	2020-12-31 07:00:00			1	2.710856389
4	1	NULL	102_STEAM_3	Coal	2020-12-31 07:00:00			1	2.20463827
5	1	NULL	102_STEAM_4	Coal	2020-12-31 07:00:00			1	2.1912900000000000
6	1	NULL	115_STEAM_3	Coal	2020-12-31 07:00:00			1	3.85191998
7	1	NULL	116_STEAM_1	Coal	2020-12-31 07:00:00			1	4.2409941941
8	1	NULL	123_STEAM_2	Coal	2020-12-31 07:00:00			1	5.92077355
9	1	NULL	123_STEAM_3	Coal	2020-12-31 07:00:00			1	9.2971393303
10	1	NULL	201_STEAM_3	Coal	2020-12-31 07:00:00			1	1.7928000000000000
11	1	NULL	202_STEAM_3	Coal	2020-12-31 07:00:00			1	1.8941401420000000
12	1	NULL	202_STEAM_4	Coal	2020-12-31 07:00:00			1	1.869
13	1	NULL	216_STEAM_1	Coal	2020-12-31 07:00:00			1	4.3

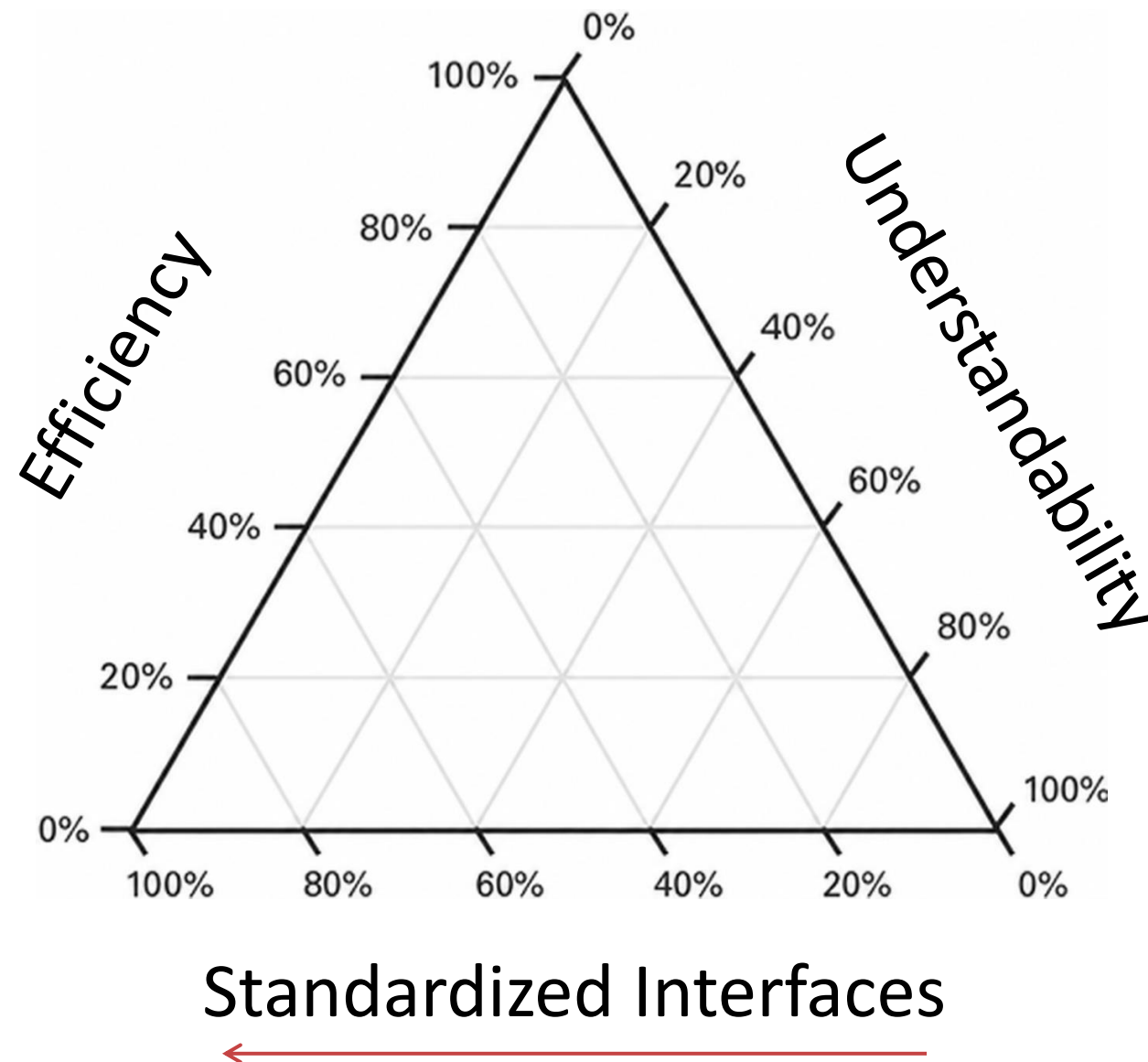
Analysis Notebook

Key Idea: Model vs Automation



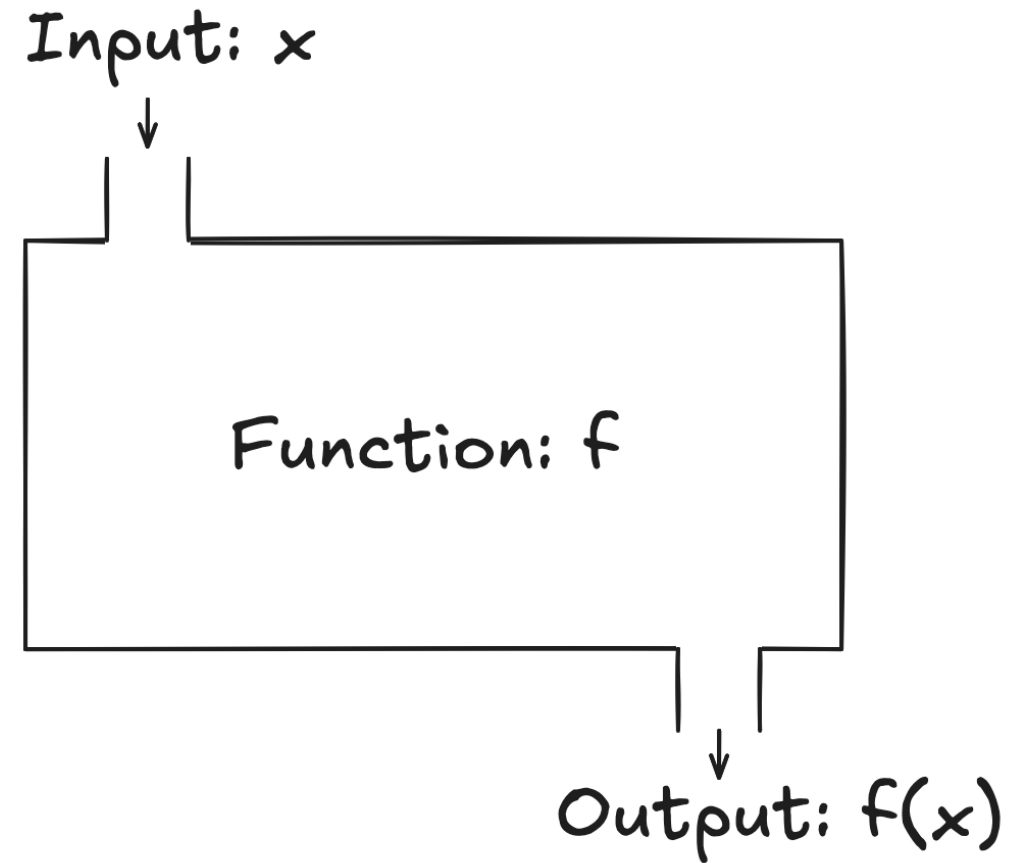
- Models are software tools combined with data; designed to solve a specific computational problem efficiently and accurately
- Models can be optimization models, machine learning approaches, novel algorithms, meaningful assumptions or simplifications
- Automation are software workflows designed to transform data from one format to another
- Automation workflows operate around data standards, programming language semantics, number crunching ability, reproducibility, sharing

Key Insights in three categories

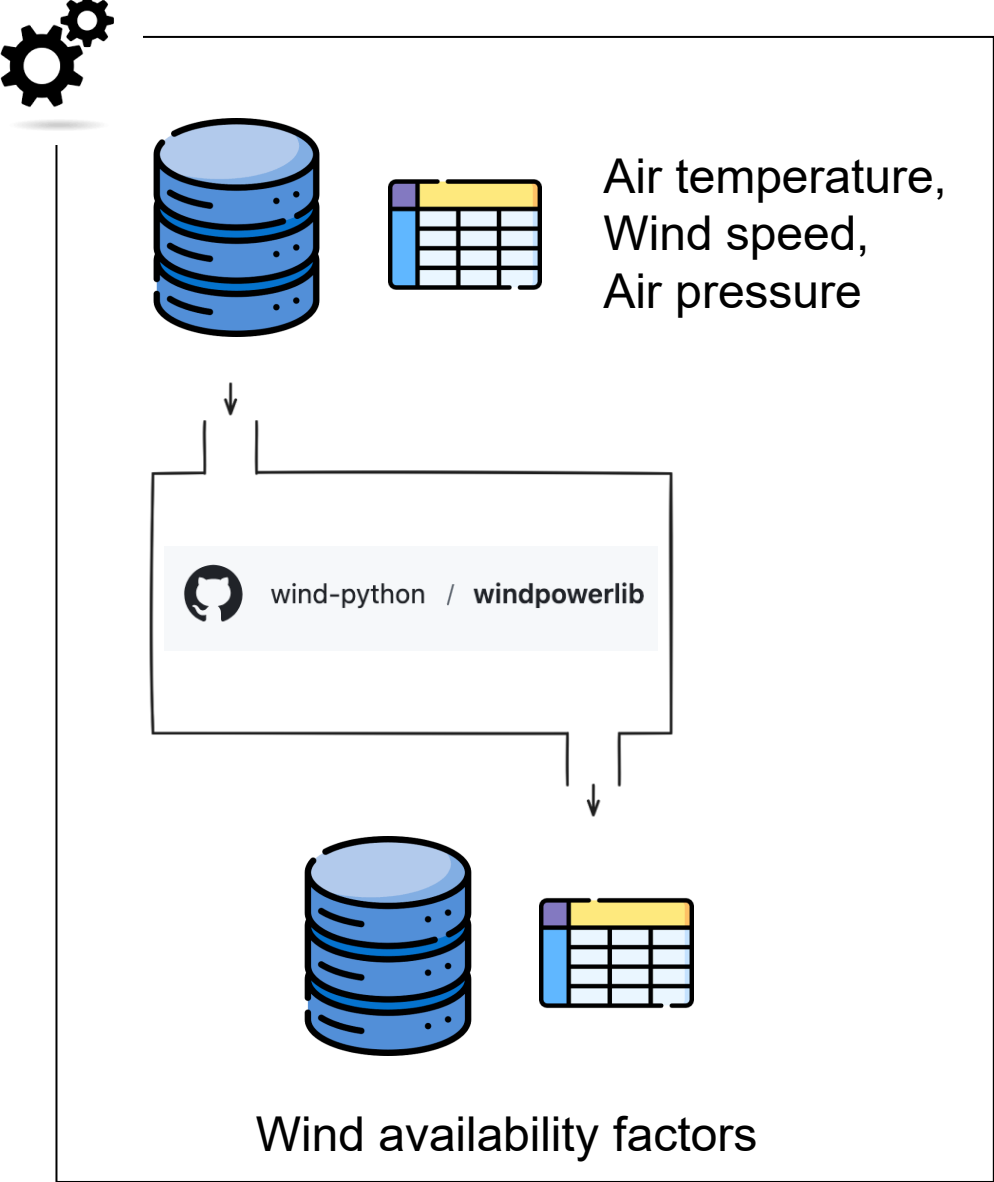
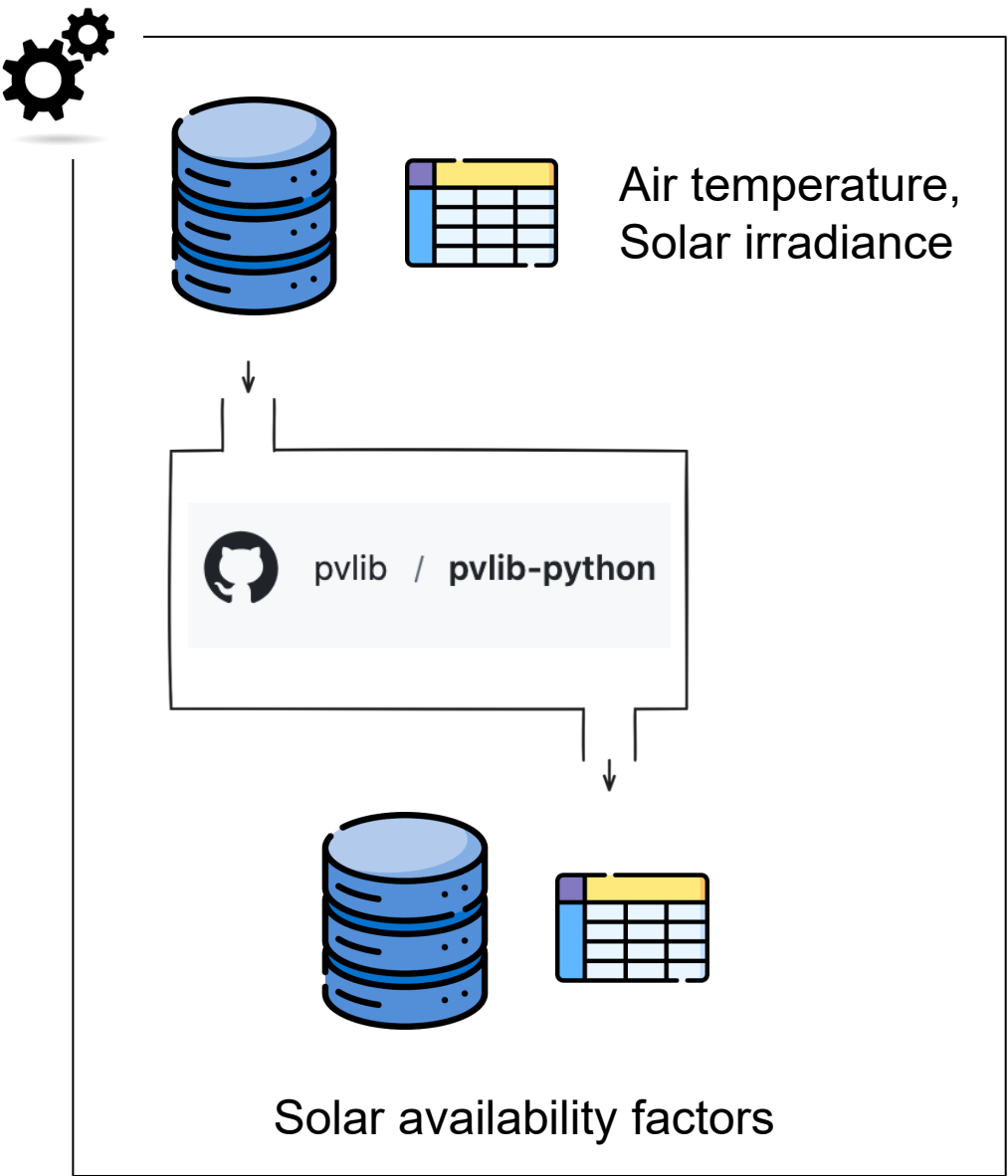


Key Idea: Effectiveness of interfaces

- At the simplest level, every workflow has the same shape.
 - We have an input, x
 - We apply a function, f
 - We get an output, $f(x)$
- This is useful way to think about what makes a data workflow
 - Reproducible
 - Shareable
 - Composable
 - Correct



Examples of workflows





Stochastic Planning Inputs Tool (SPI-Tool)



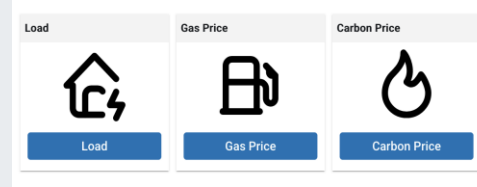
SPI-Tool (*pronounced "spy-tool"*) is a software application that helps electric system resource planners characterize uncertainty and prepare planning model inputs for commercial and open-source stochastic planning models in five easy steps.

The initial release of SPI-Tool supports generating distribution parameters and probabilistic samples for **three inputs**: load, gas prices, and carbon prices.

Available on EPRI.com (alpha)
Product ID: [3002032424](#)

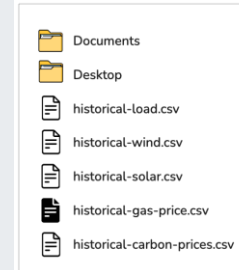


1



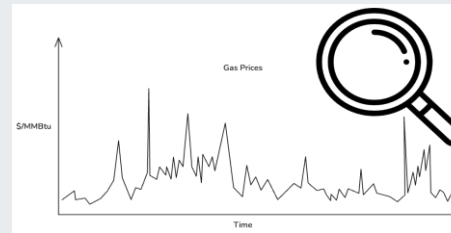
Choose uncertainty input kind to generate samples

2



Import historical input data

3



Fit stochastic process parameters

4



Generate probabilistic samples

5



Export data in standard formats

For Additional Information:

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What makes a good workflow

Reproducibility

Make all inputs explicit
Declare dependencies explicitly

Sharable

Version controlled
Environment agnostic

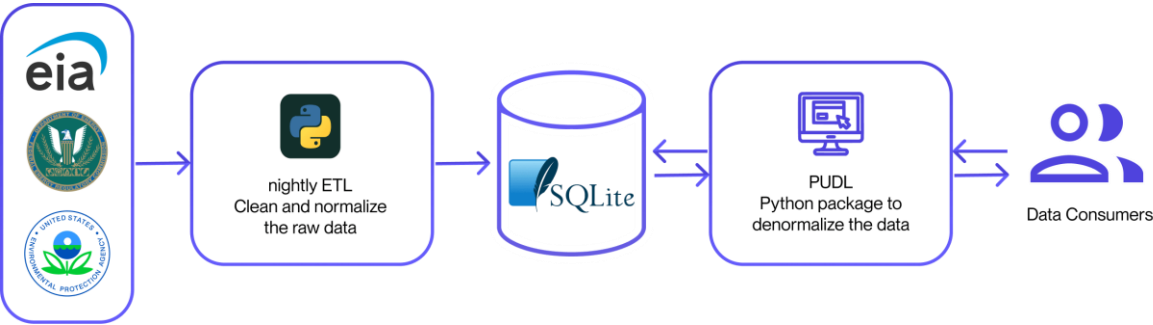
Composable

Data transformations chain into each other
Well defined interfaces for each component

Correctness

Test small individual components in isolation

Examples of Data Standards and Data Orchestration Frameworks



PUDL (Catalyst Cooperative)

CODERS Version: v3

Version 1 (Pub. Oct 2023)

Version 2 (Pub. Oct 2024)

Version 3 (Pub. Oct 2025)

Open Source Tables

Nodes

Nodes

Transmission

Protected Tables

Model Assumptions

Nodes

Associated endpoints: /nodes

The nodes table tracks information about energy nodes, including geographic details (latitude, longitude), ownership, operating region, copper balancing area, and additional notes. It supports mapping and ar

Data Preview

node_name	node_code	node_type	owner	latitude	longitude
Bullseye 1004S [Source: 13]	AB_1004S_GSS	Generation	ATCO Electric Ltd. [Source: 6]	51.180979 [Source: 62]	-110.260055 [Source: 62]
Dunmore 1011S [Source: 13]	AB_1011S_GSS	Generation	Altalink Management Ltd. [Source: 6]	50.033284 [Source: 62]	-110.480364 [Source: 62]
Dunmore 1011S JCT [Source: 13]	AB_1011S_JCT	Junction	Altalink Management Ltd. [Source: 6]	50.033326 [Source: 62]	-110.482743 [Source: 62]
Deer Hill 1012S [Source: 13]	AB_1012S_DSS	Distribution	Altalink Management Ltd. [Source: 6]	53.806344 [Source: 62]	-116.619471 [Source: 62]

CODERS (EMH)

Interoperability workshop at LF-Energy in Berlin in mid-September, organized by G-PST Open Tools

r2x-core

Extensible framework for power system model translation

pypi v1.2.0

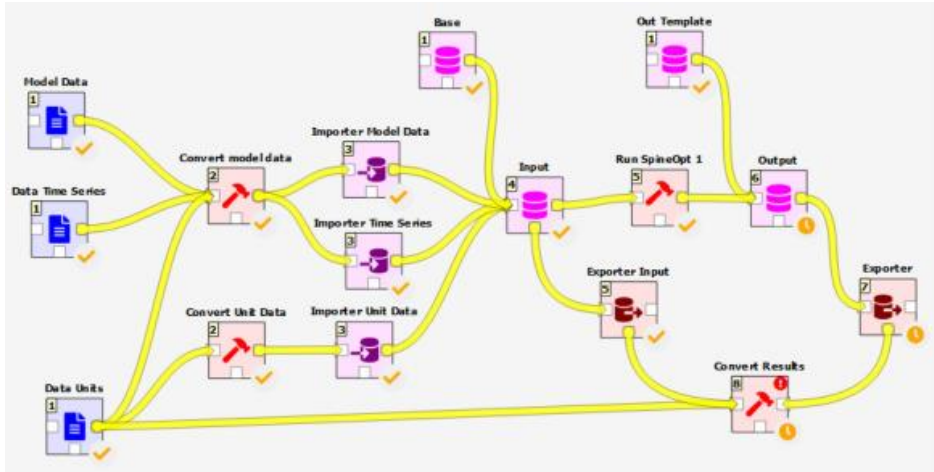
license BSD

python 3.11 | 3.12

CI passing

docstr-coverage 100%

R2X (NREL)



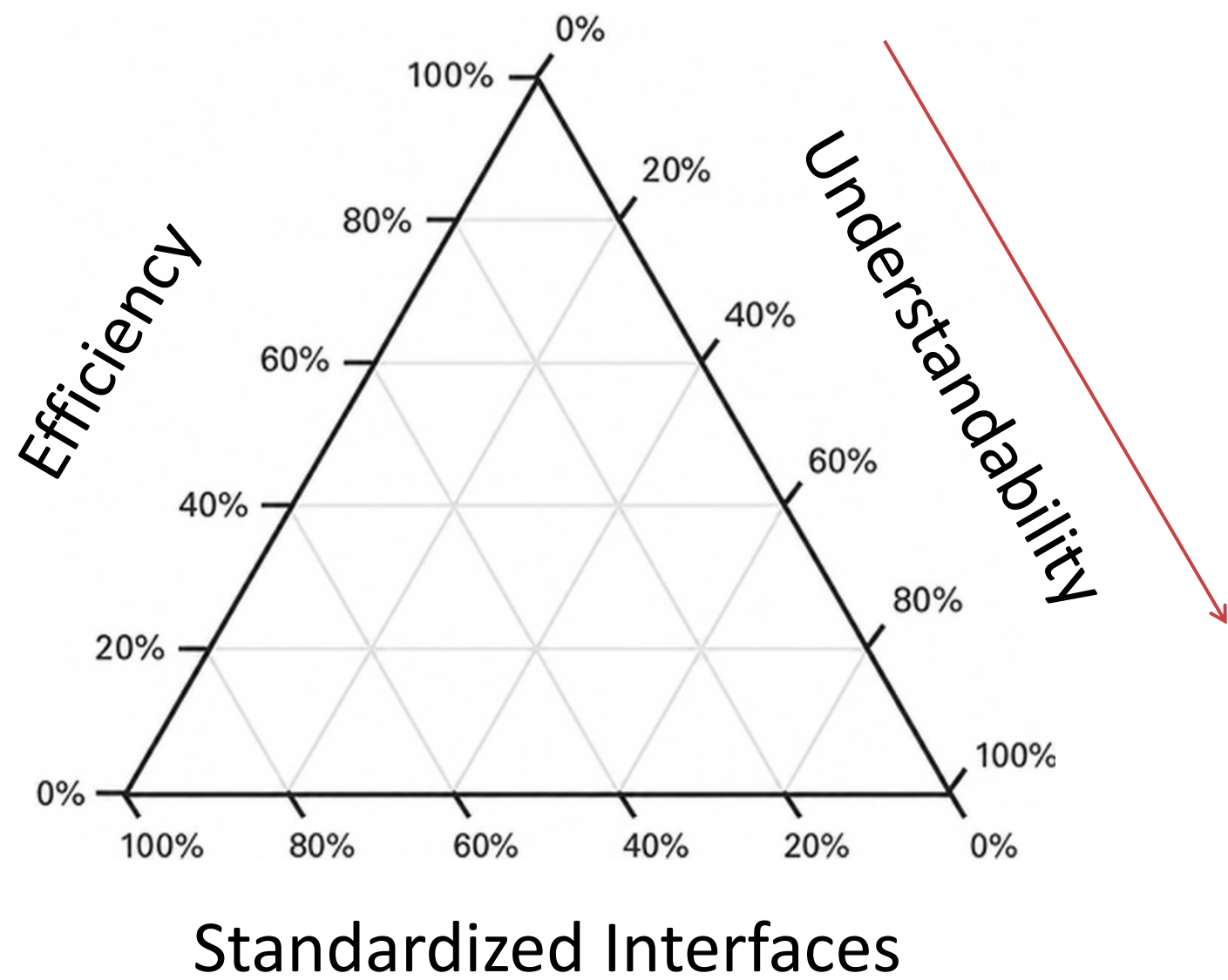
Spine Toolbox + INES DB (VTT)

PIPES

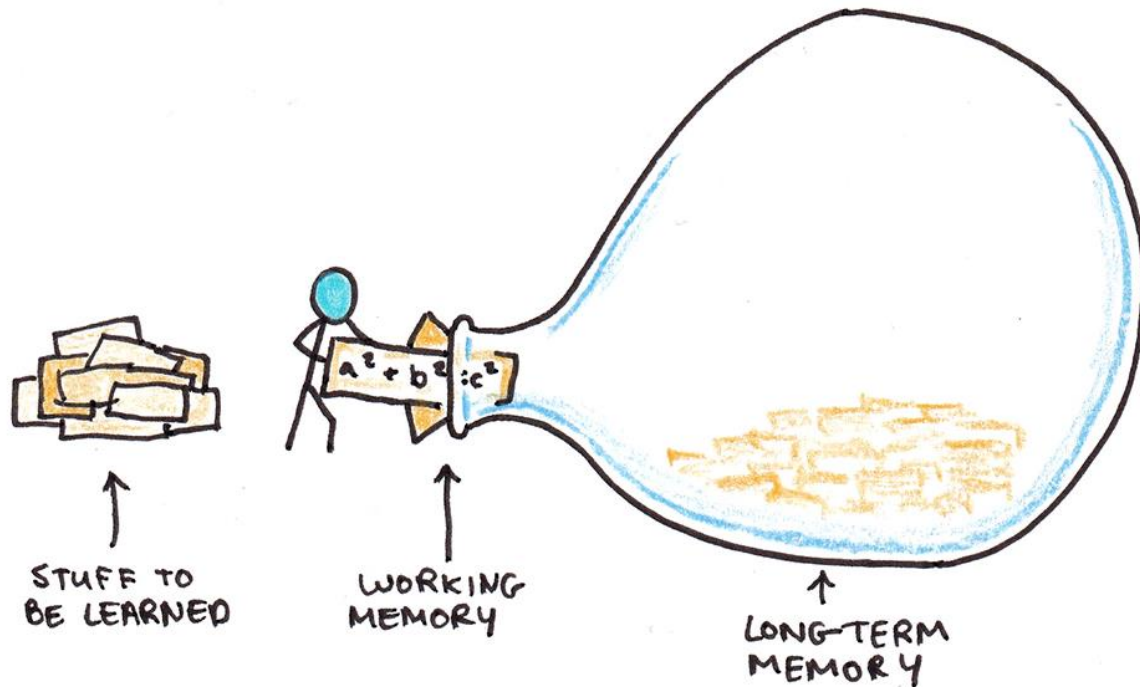
PIPELINES FOR INTEGRATED
PROJECTS IN ENERGY SYSTEMS

PIPES (NREL)

Key Insights in three categories



Key Idea: Understanding is at a premium



- **Choose simplicity**; reserve complexity for high-value work
- Keep behavior **local**
- Optimize for **fast feedback**
- **Automate** repetitive checks and test continuously
- **Prefer predictable and standard patterns** over clever solutions

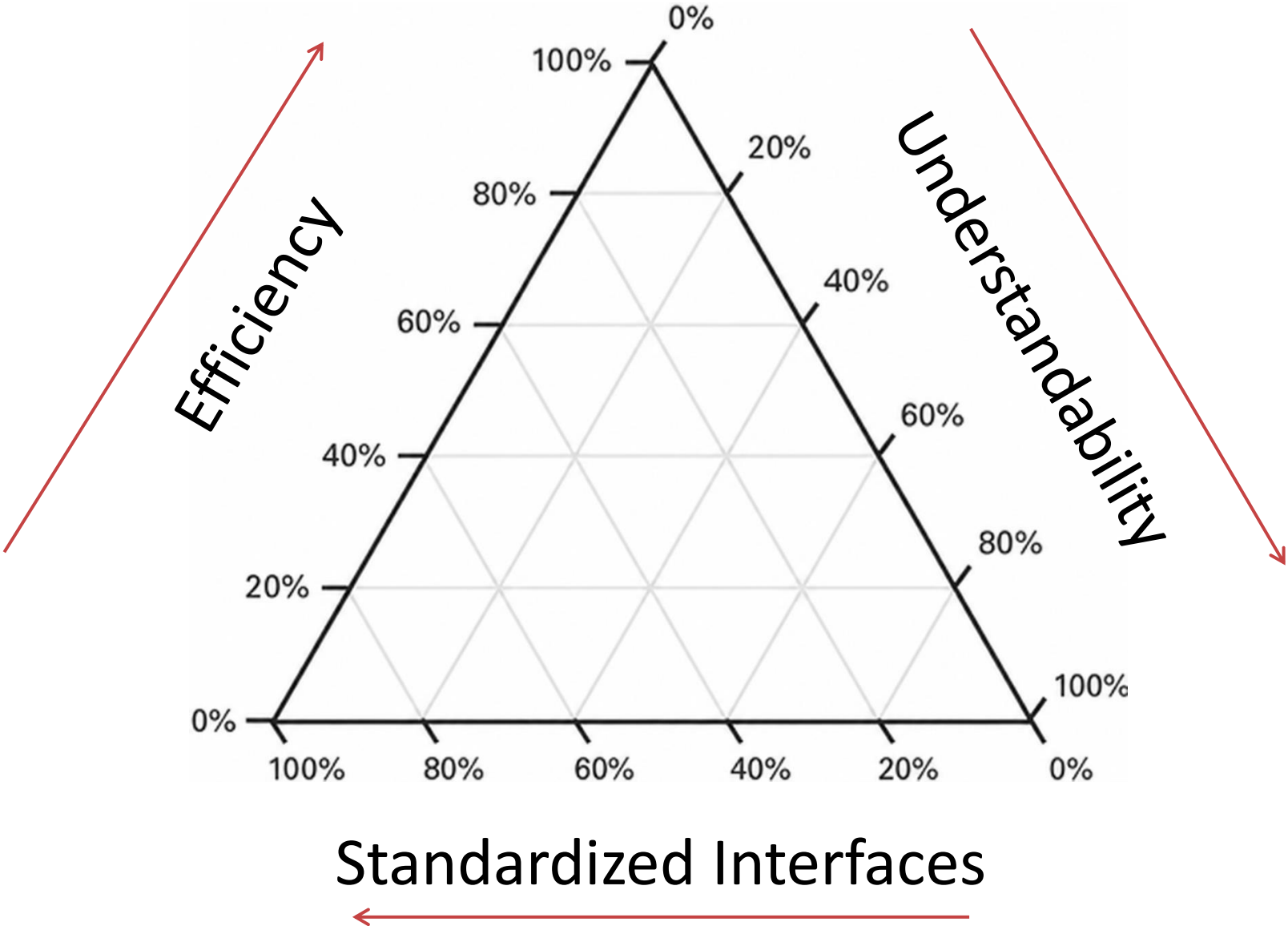
<https://www.scotthyoung.com/blog/2022/01/04/cognitive-load-theory/>

A case for “No AI Fridays”

- LLMs can **weaken problem-solving**, creativity, memory, and critical thinking skills
- Generate large amounts of code that can only be maintained with LLMs in the future; **trade-off between a temporary speed boost and permanent indenture**
- Are **not (yet) good at holistic problem solving**, and can over-index on a user prompt; can be sycophantic and reinforce personal biases
- Surface statistically most likely output; **generic and average results**
- Runs code without verification; **security concerns**
- Uses significant computing power for trivial tasks; **societal and environment concerns**
- Currently have **negative public perception**; associated **reputational harm** with knowledge work



Key Insights in three categories





TOGETHER...SHAPING THE FUTURE OF ENERGY®