

Process Development and Integration Lab + Measurements and Characterization

PDIL Presentations

PDIL Introduction

Thin-Si Platform

Si Wafer Replacement Platform

CIGS Platform

CdTe Platform

Atmospheric Processing Platform

M&C Platform and Standalone Capabilities

Data Integration

M&C Overview



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April 22-24, 2008 in Austin, Texas

Austin Airport Marriott South

Austin, TX April 22-24, 2008



2008 Solar Annual Review Meeting

PDIL Overview

Brent P. Nelson





PDIL Vision

- **Integrate deposition, characterization, and processing**
 - Flexible and robust
 - Standardized transfer interface
 - Controlled sample ambient between tools
- **Benefits**
 - Answers to previously inaccessible research questions
 - Control and characterization of critical surfaces (interfaces) and how their impact on subsequent layers
 - Assess process-related source chemistry, surface chemistry and kinetics, and bulk reconstruction
 - Grow layers and alter interfaces using controlled processes and transfer ambients (without exposure to air)
 - Develop new techniques, methodologies, device structures, materials, and tools (growth, processing, and analytical)
 - Improved collaborations with university and industry researchers

PDIL Concept

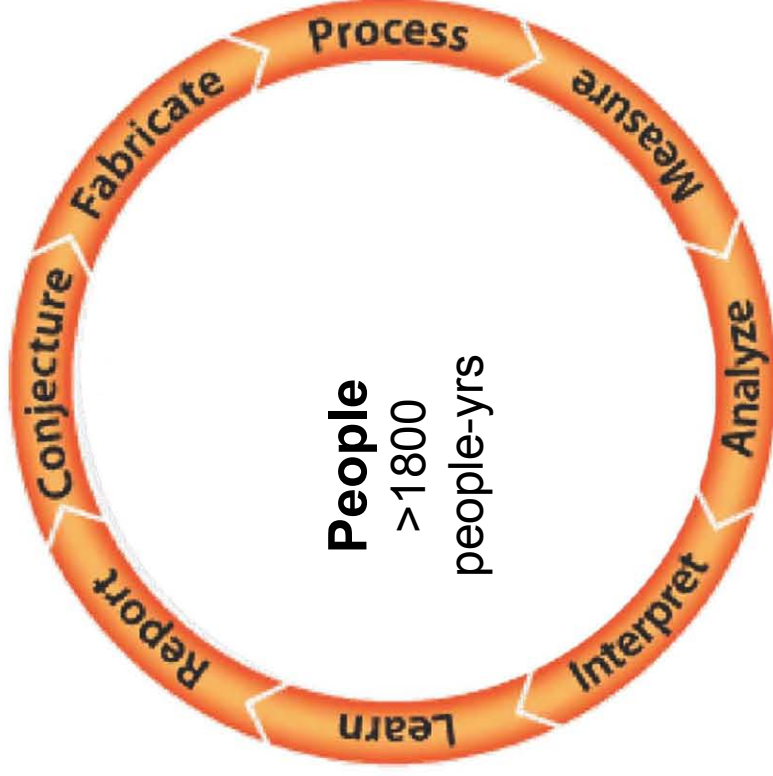


Data

recipes
instrumentation
results
data mining
modeling
...

Materials

TCO's
Metals
Semiconductors
...



Equipment

deposition
processing
measurement
...

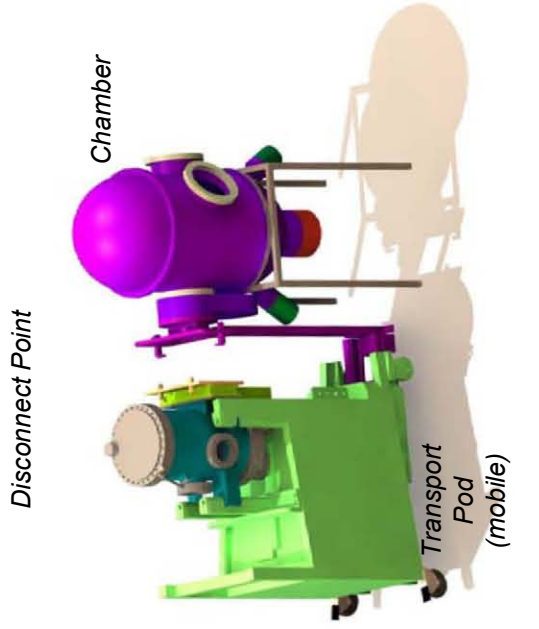
The PDIL = Collaborative Facility

- work closely with NREL scientists
- integrated equipment
- answer pressing PV related questions

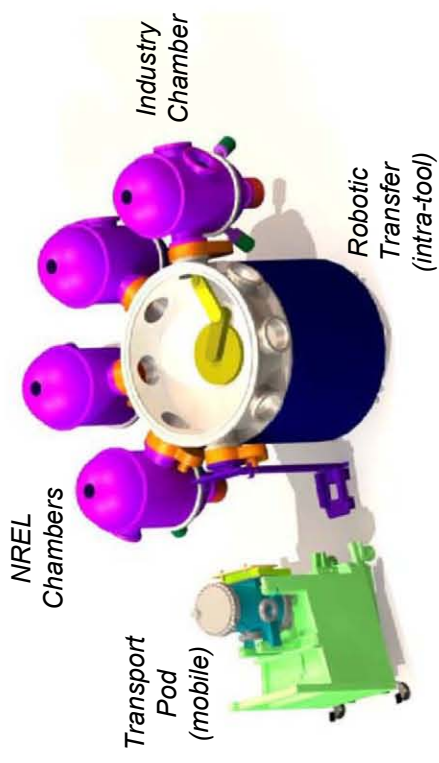
PDIL Implementation



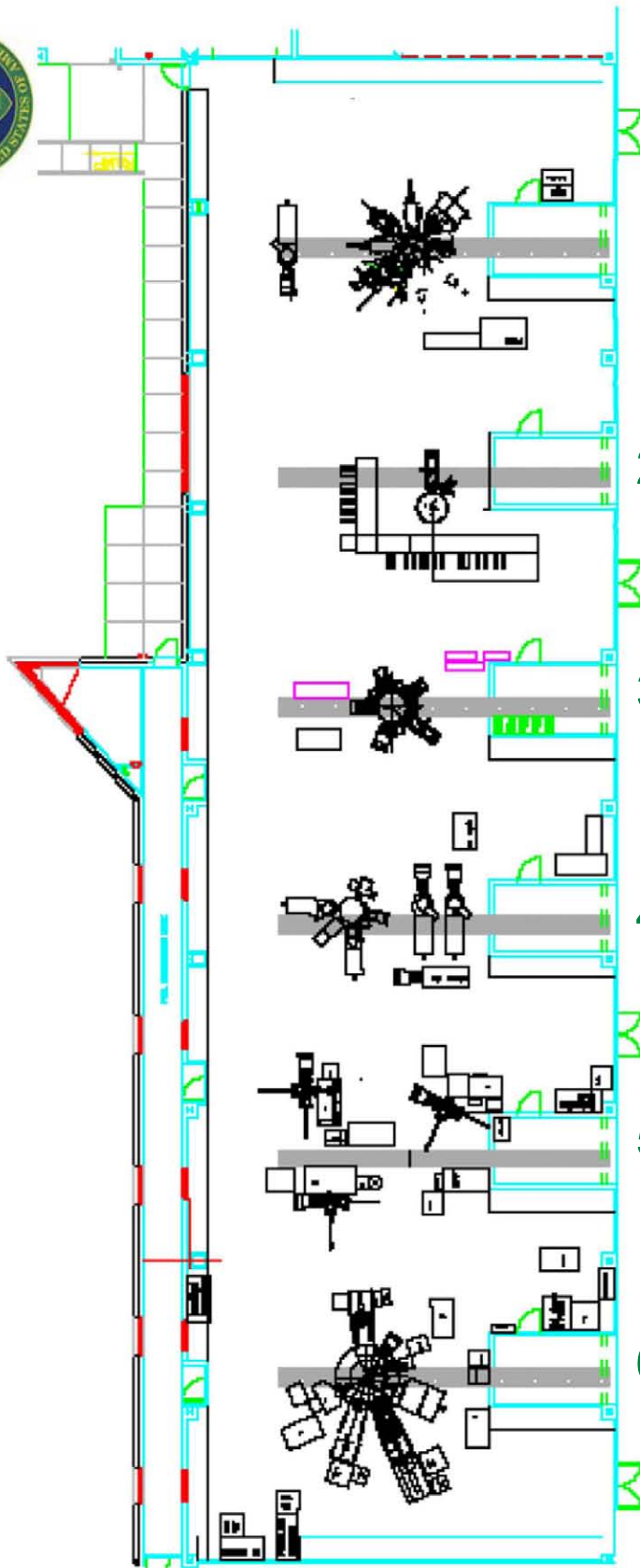
Stand-Alone Tools



Platform: Robotic Transfer



PDIL Equipment Platforms



1) CIGS Platform

2) Atm. Processing

3) Silicon Platform

4) Si / CdTe

5) M&C Stand-Alone

6) M&C Integrated

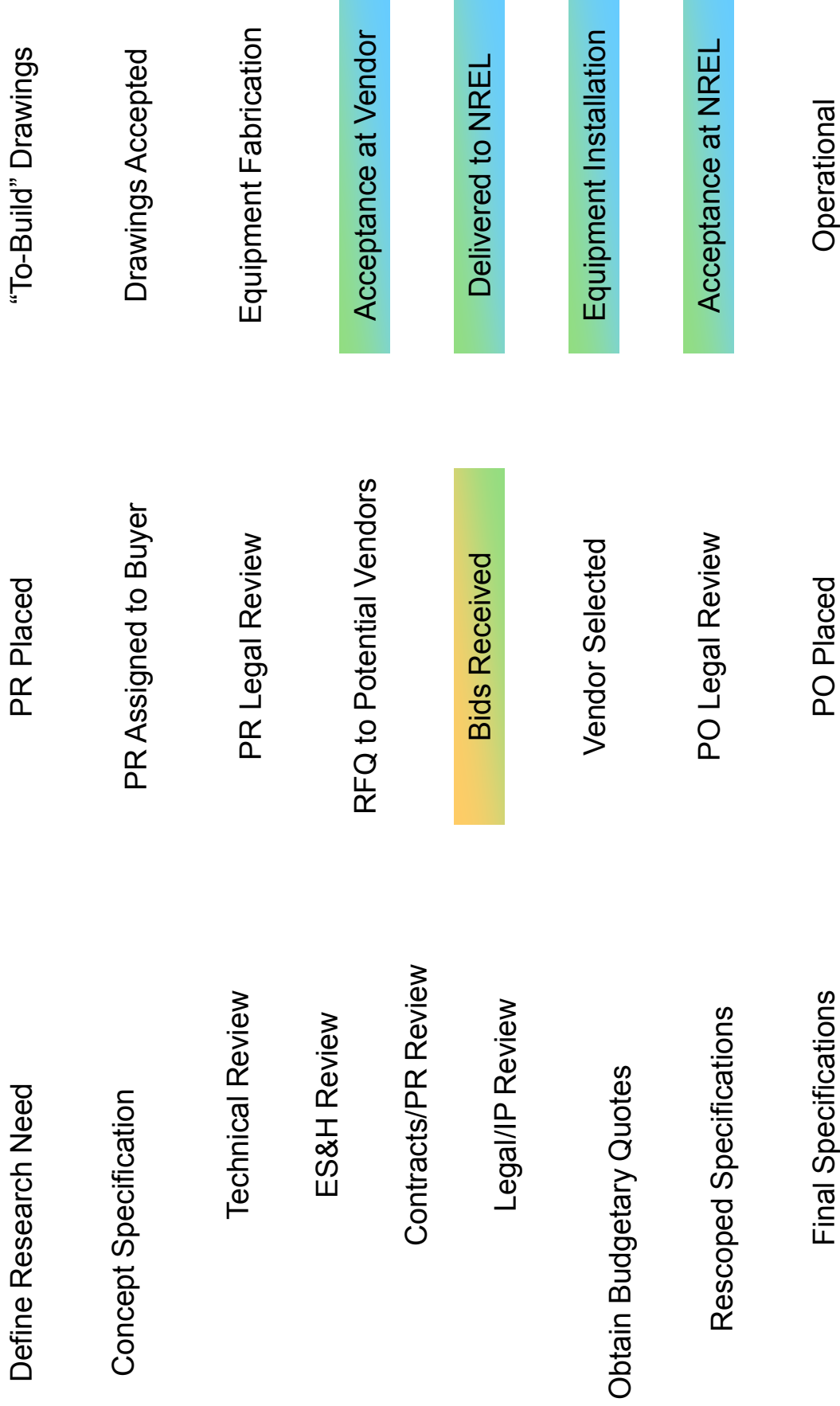
PV Technology Road Map Support



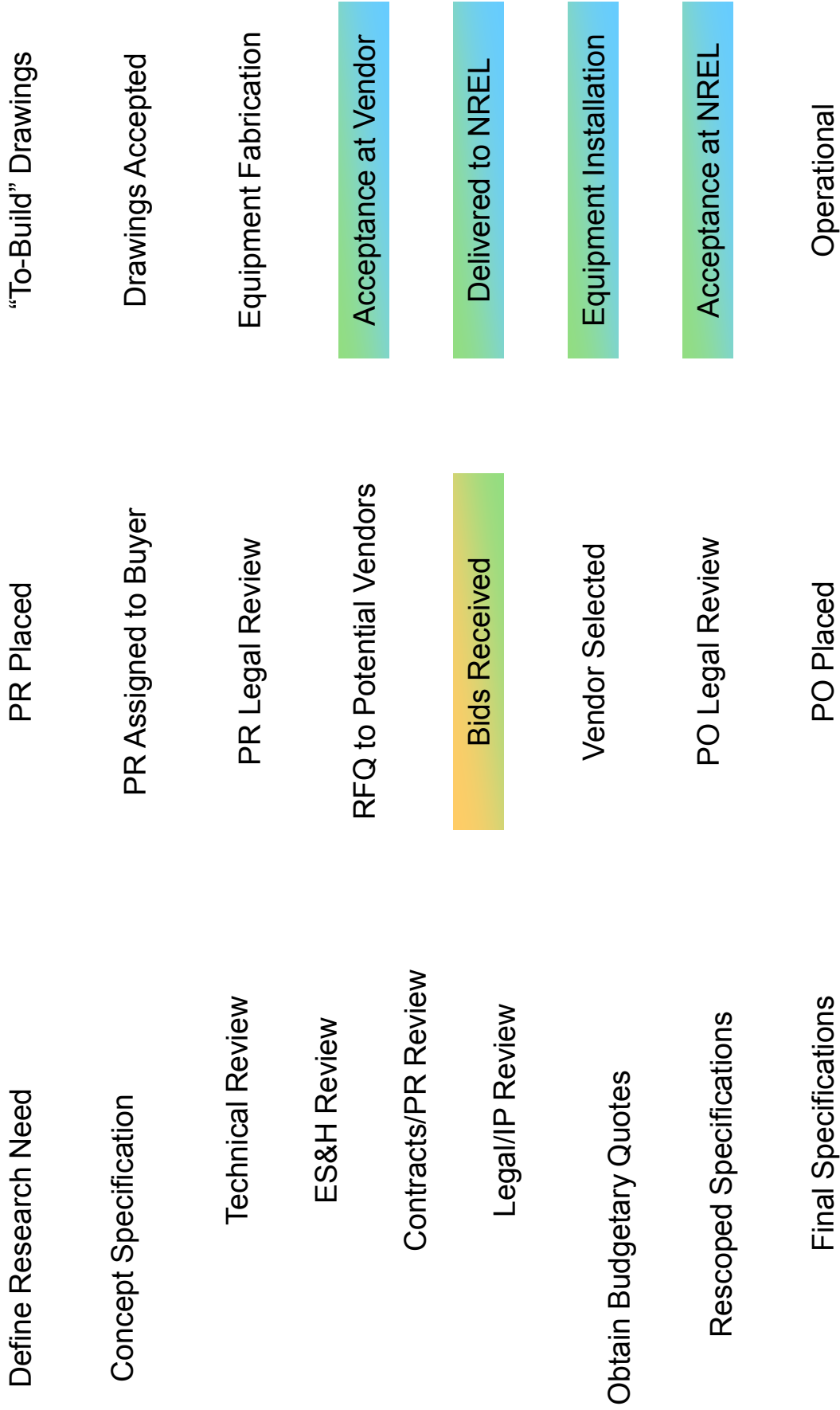
PV Technology Road Maps

Platform	Wafer Si	Film Si	CPV	CdTe	CIGS	OPV	DSPV
Thin Si							
Wafer Rep.							
CIGS							
CdTe							
Atm. Proc.							
M&C Ind.							
M&C Cluster							

Steps in Custom Equipment Acquisition



Industrial Input



Thin-Silicon Platform

Qi Wang



PV Technology Road Maps

Platform	Wafer Si	Film Si	CPV	CdTe	CIGS	OPV	DSPV
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Thin Si

Wafer Rep.

CIGS

CdTe

Atm. Proc.

M&C Ind.

M&C Cluster