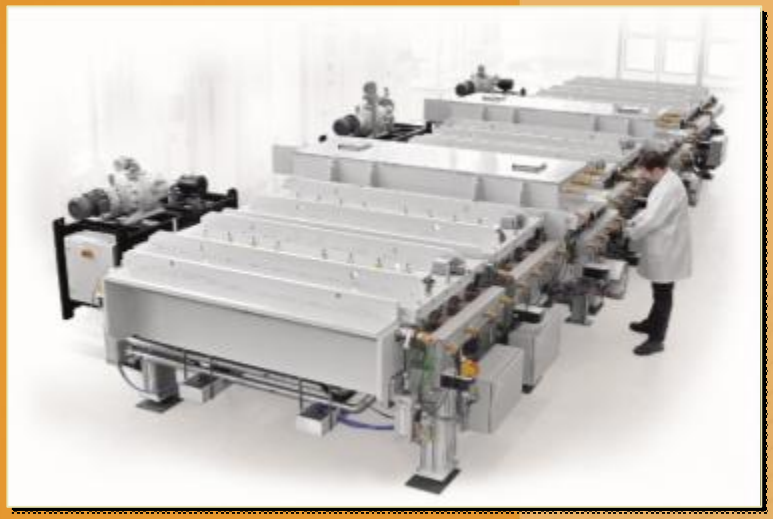
SVTC



SVTC Solar

A Photovoltaic Product Development Center

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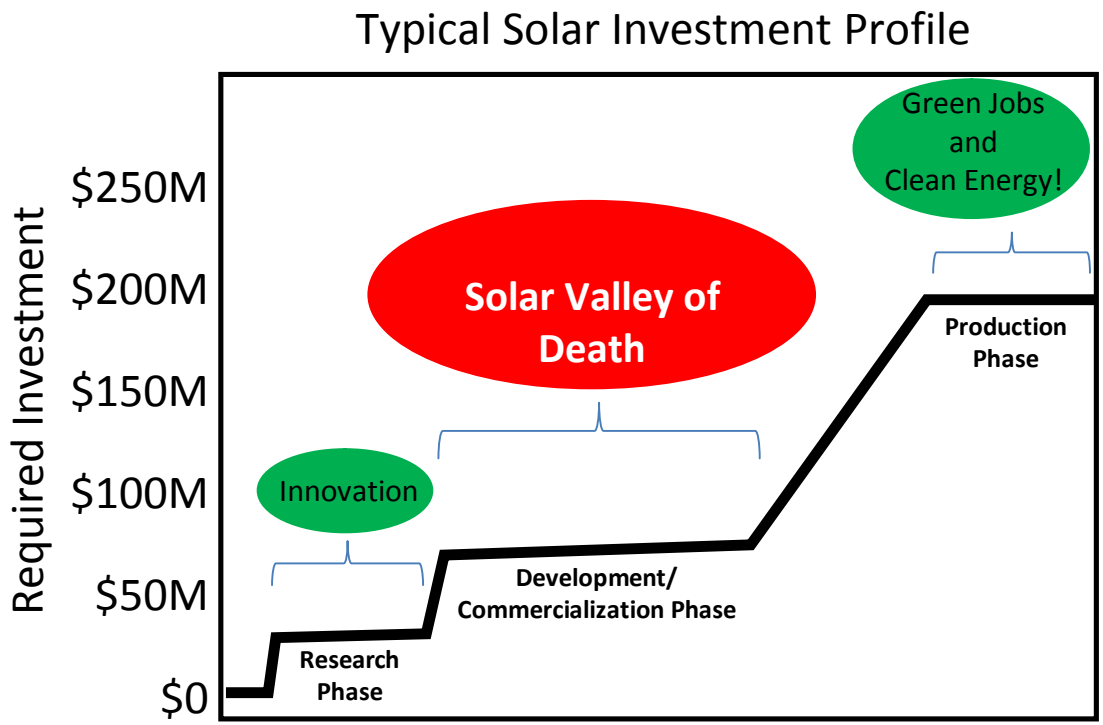
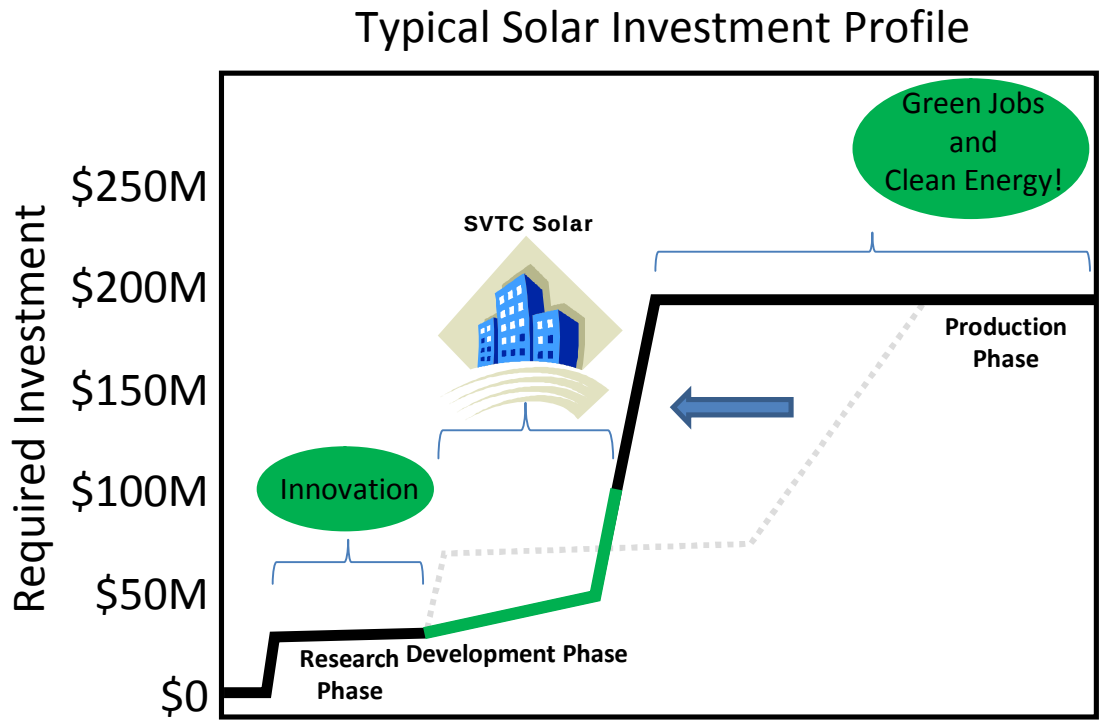
The new "Solar Valley of Death"



- **Investors will no longer fund solar technologies until they have proved manufacturability**
- **To prove manufacturability, significant investment in capital equipment and expertise is required**

"Valley of Death"

Solution: A Solar Development Center



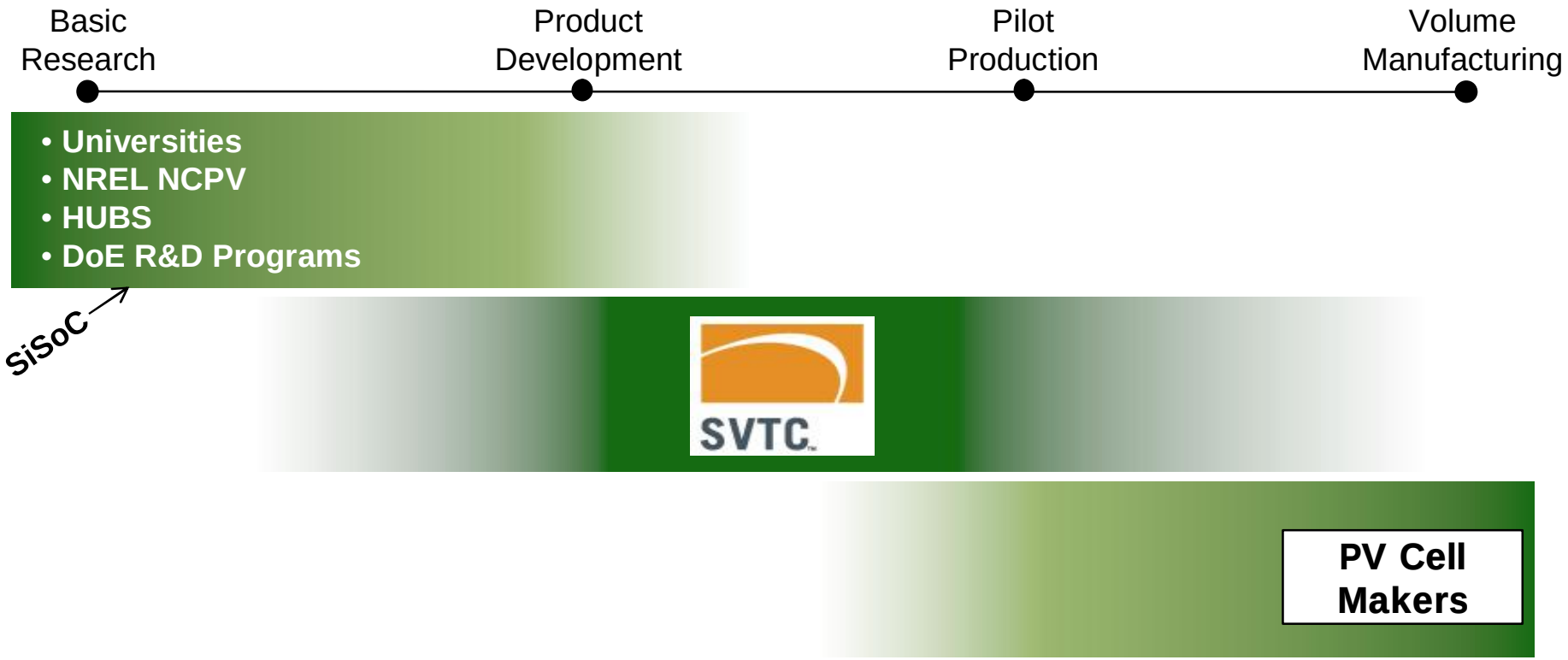
Enable solar companies to bridge the Valley of Death

- **Cut development costs**
- **Cut development times**
- **De-risk technology for financing**
- **Accelerate production ramp (qualified processes and pilot capacity)**

Synergy with PV Research Centers

- **Not a research center . . .**
  . . . a product development and piloting center

- **High synergy with PV research centers like NREL's NCPV**



SVTC: Who are we?

We provide product development foundry services to semiconductor, biochips, photovoltaic and MEMS companies

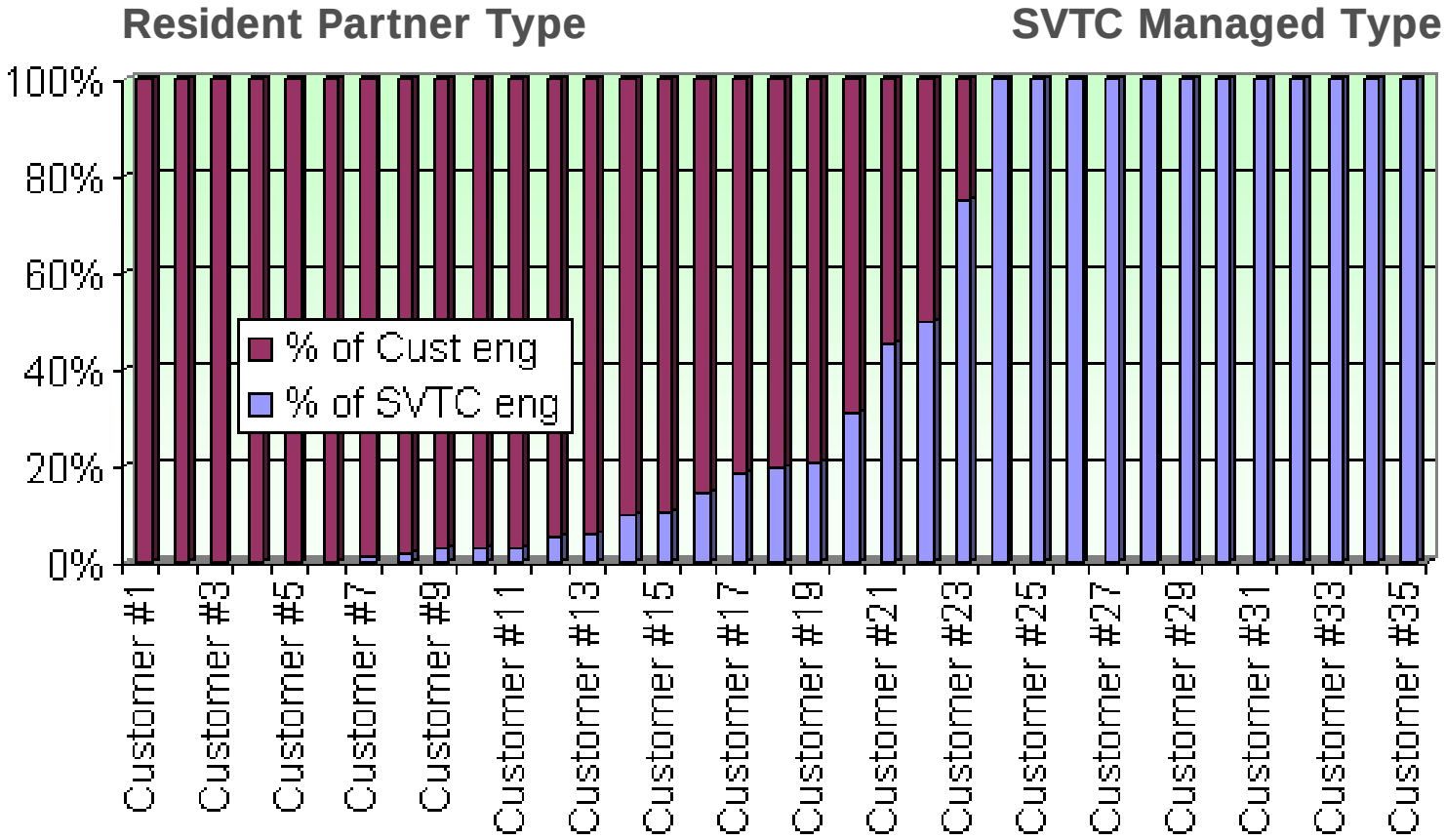
- 200+ employees
- Two Class 10, 8” CMOS fabs
- One dedicated photovoltaic fab
- 24x7 operations & maintenance support
- Pilot-scale manufacturing capacity
- More than 250 production grade process & metrology tools:
- Process library with over 2500 recipes
- Diverse set of materials and processes capabilities
- Additional enabling services: engineering support, analytical services, reliability

San Jose, Calif. (8”)
27k sq. ft

Austin, Texas (8”)
68k sq. ft

San Jose, Calif (8”)
20k sq. ft

Not just a “User Facility”
Not just a “Foundry”



- Hands-on access
- Expert engineering resources (scalable)
- Balance optimized for each customer over time

What is a Solar Development Center

Key Requirements

- Manufacturing Equipment
- Leverage Across Tools
- Flexibility to Innovate
- Manufacturing Expertise and “Culture”
- Alternative Materials
- Analytical Services
- IP Ownership/Security
- Many Types of Customers

Key Elements of a Solar Development Center

Key Requirements

- **Manufacturing Equipment**
- **Leverage Across Tools**
- **Flexibility to Innovate**
- **Manufacturing Expertise and "Culture"**
- **Alternative Materials**
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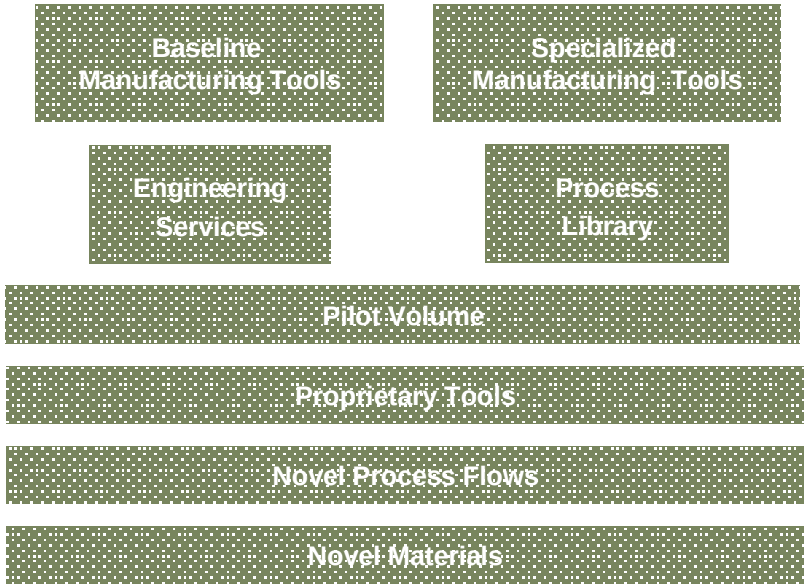
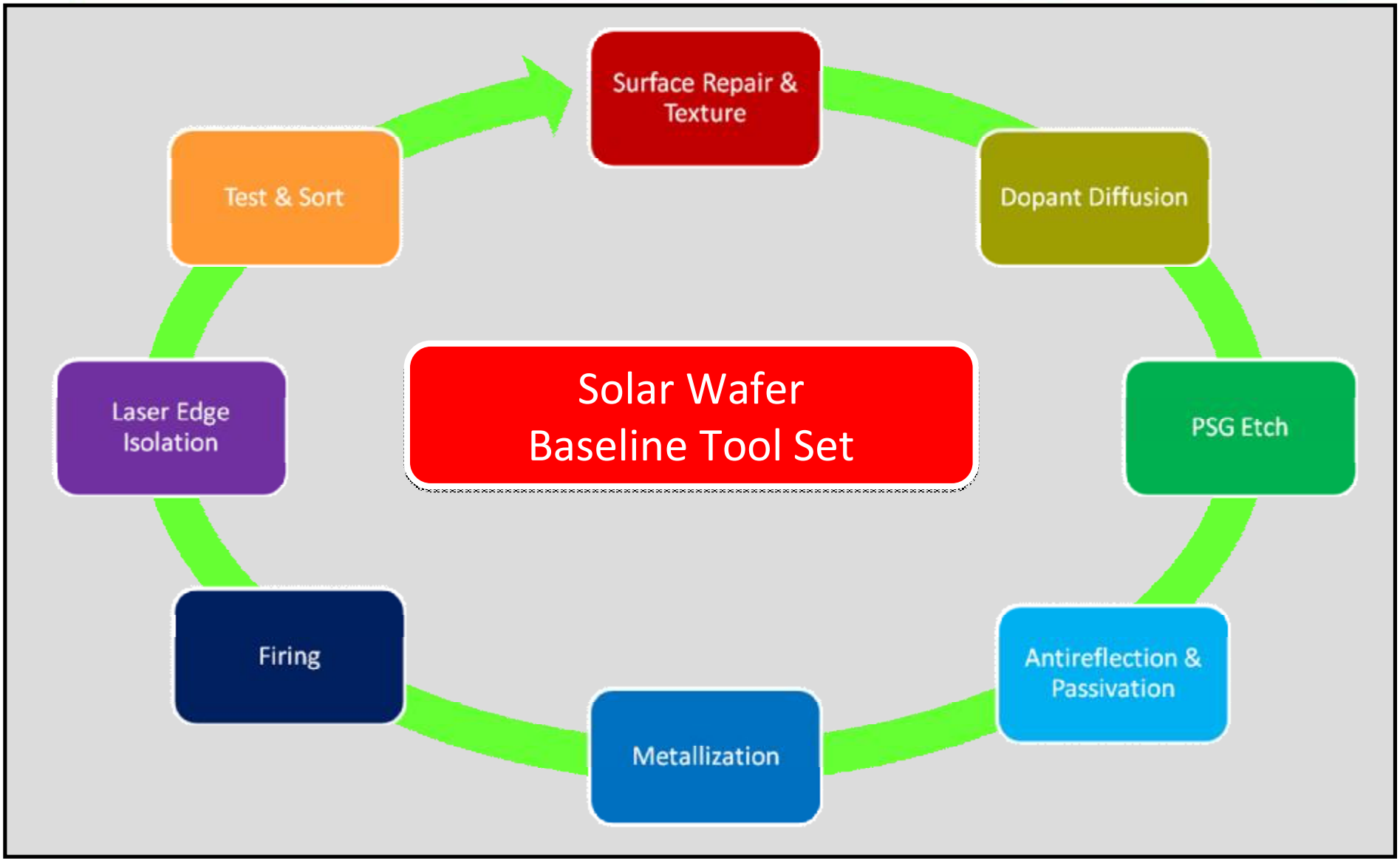
Development Capabilities



Additional Services

Rapid-Cycle Wafer Development Line



Rapid-Cycle Wafer Development Line

Manz Test and Sort

RENA Acid Etch

+

RENA Base Etch

Despatch Dope/Diffuse
(in-line Boron)

+

SemCo Dope/Diffuse
(Batch Boron/Phos.)

Roth & Rau, USA
30MW Baseline Tool Set

Manz Laser Isolation

RENA Wet Etch

+

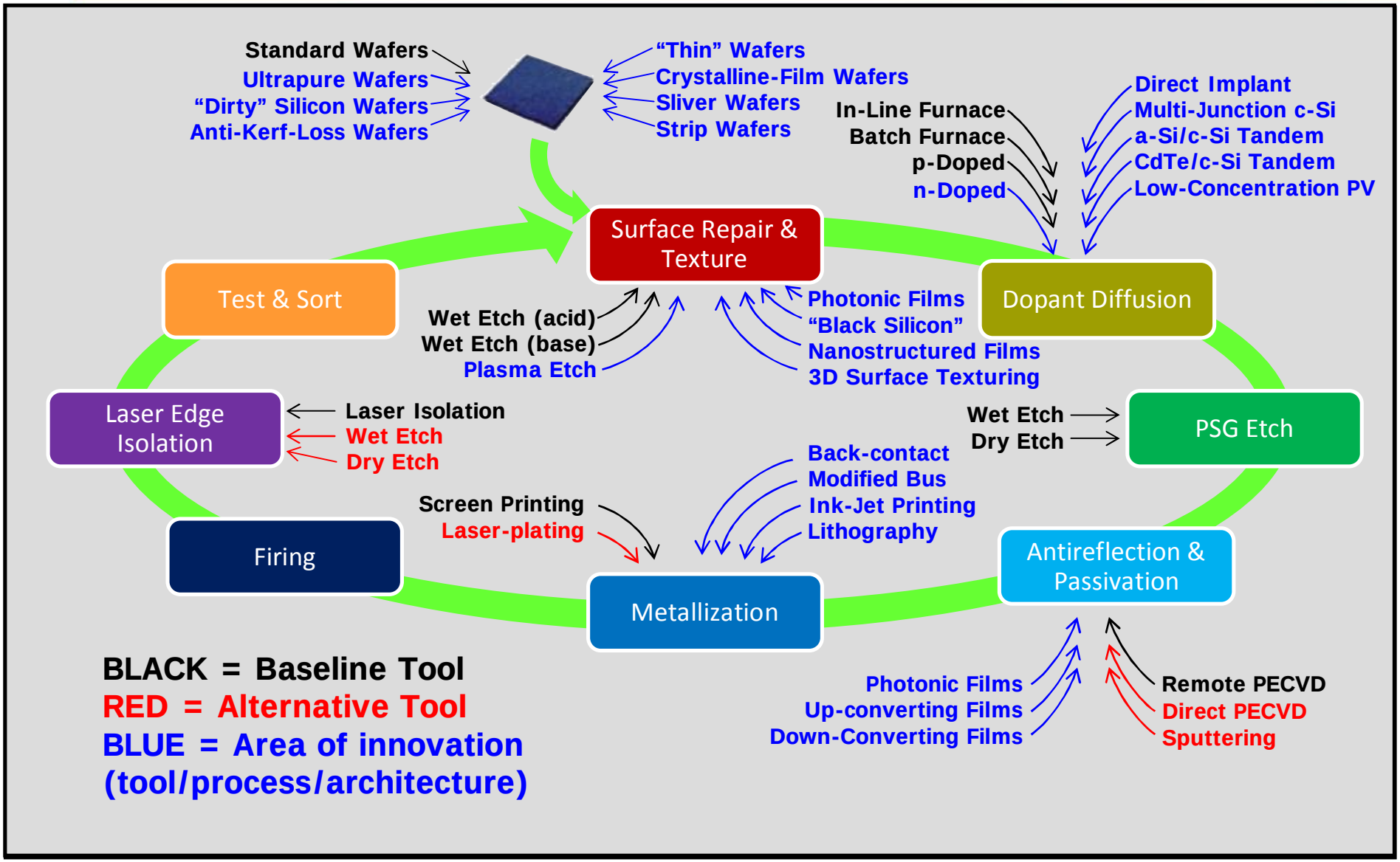
Roth & Rau
Plasma Etch

Despatch Firing Furnace

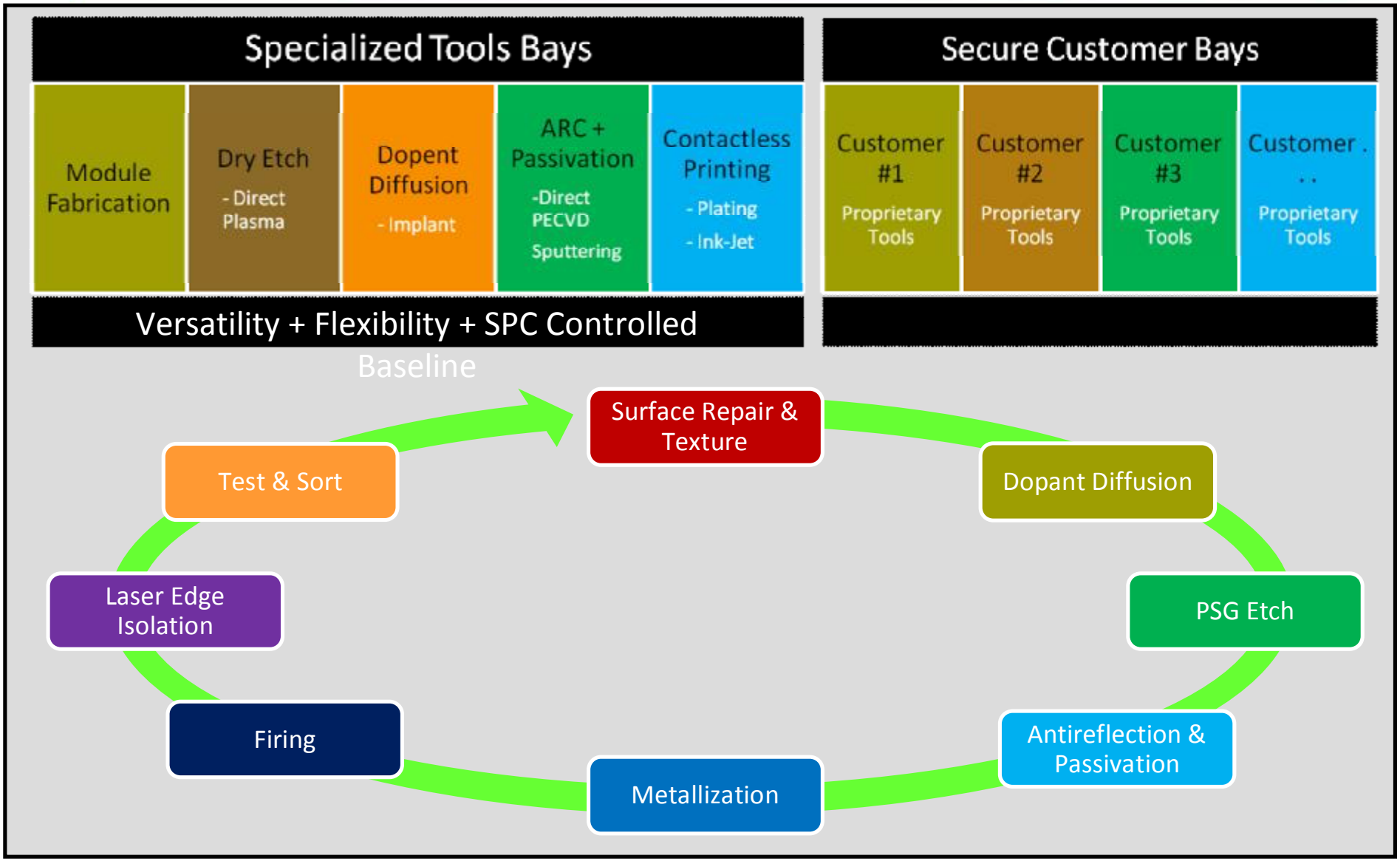
Bachinni Screen Print

Roth & Rau PECVD

Opportunities for Innovation



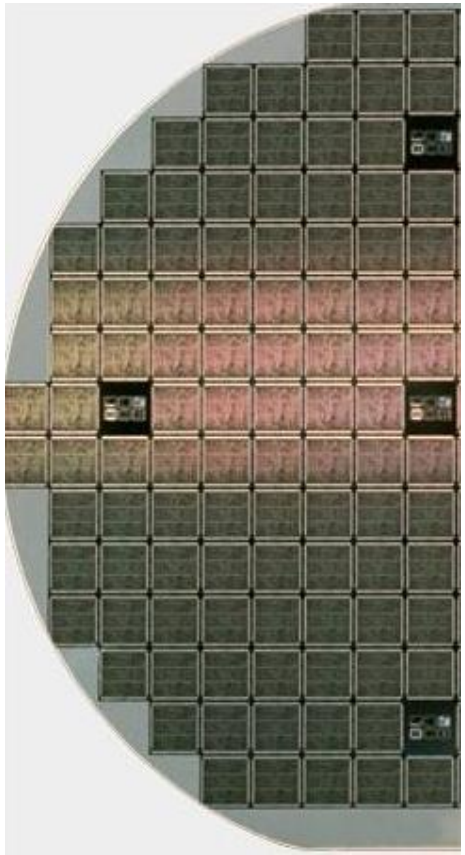
Facilities to Innovate



Access to a Broad Range of Alternative Semiconductor Processes

SVTC Fab 1 and 2

- CMOS, MEMS, image sensors . . .
- 250 semiconductor manufacturing and metrology tools
- More than 2500 processes
- Unparalleled flexibility for process and technology development



- Novel memory
- Novel transistors
- MEMS/MOEMS
- High-voltage
- Image sensors
- Bio-tech
- Photovoltaic

Key Elements of a Solar Development Center

Key Requirements

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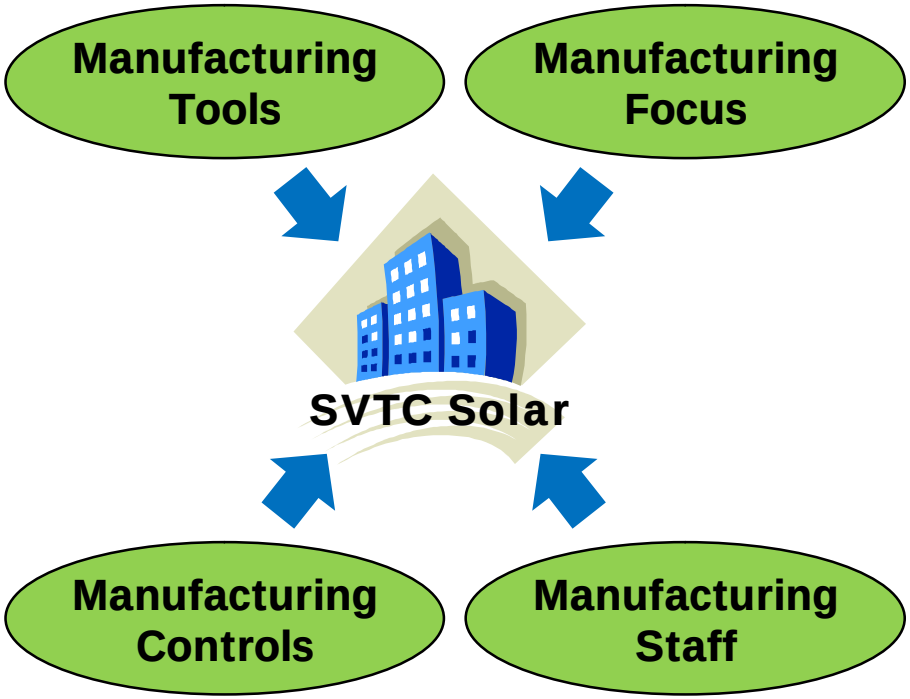
Not another research center



NREL + SVTC Solar = Synergy

Key Elements of a Solar Development Center

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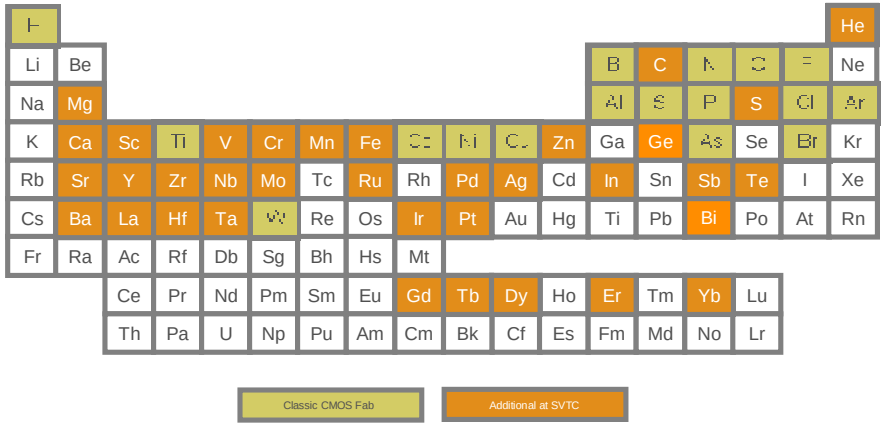
Materials Currently Running in SVTC's CMOS Facility



- Advanced materials are critical to solar innovation
- Working with novel materials is an SVTC core competency (52 elements run through CMOS lines)
- Many new materials will be added for solar development (customer driven)

Key Elements of a Solar Development Center

SVTC

Key Requirements

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- Many Types of Customers

In-house analytics enable rapid feedback for development

- Complete manufacturing metrology
- Complete materials and device analytics (TEM, SEM, XRD, FIB . . .)
- Cell test and analytical equipment (solar simulator, minority carrier lifetime, micro-crack detection . . .)
- Failure Analysis
- Cell certification services (in-house partner)
- Module test and reliability certification (in-house partner)

Key Elements of a Solar Development Center

SVTC

Key Requirements

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- Analytical Services
- **IP Ownership/Security**
- Many Types of Customers

No Leakage

No Cross-Contamination

No "Hooks"

"Your IP is your IP . . . . . <u>Always</u>"

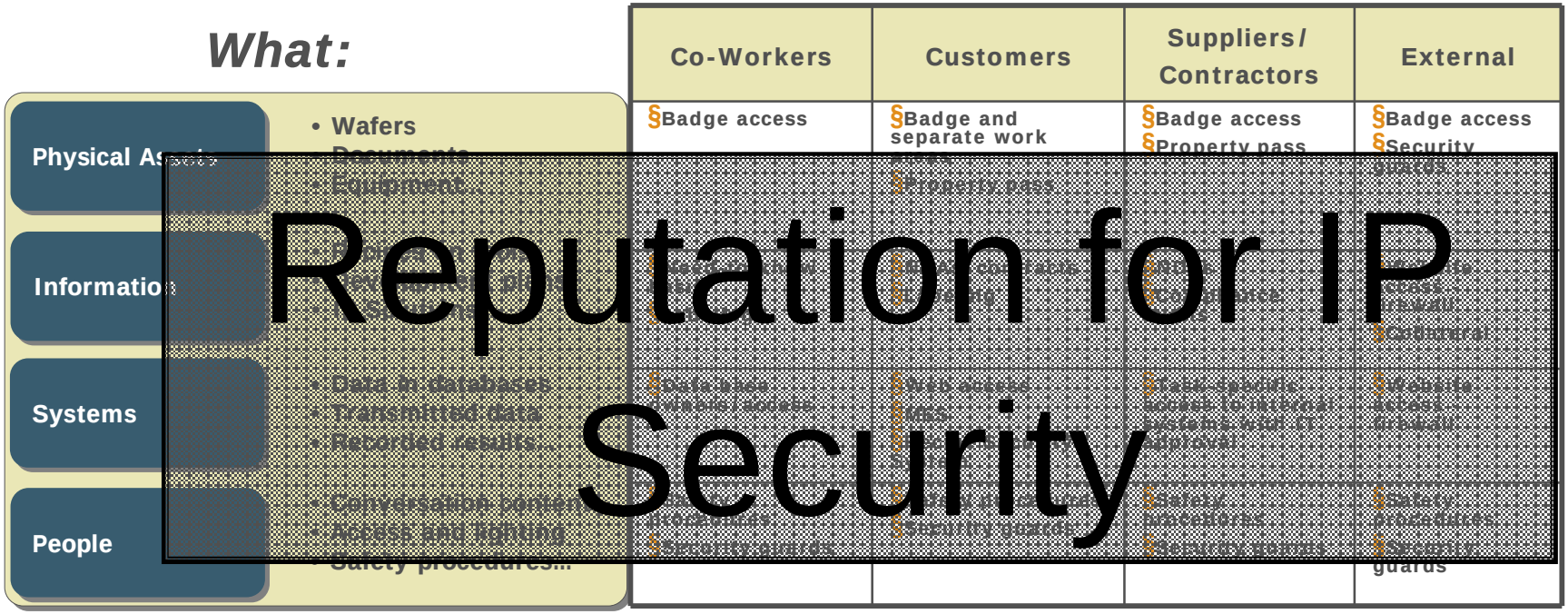
Confidentiality & Security Policy

Customers own their IP - always!

POLICY: ***SVTC and its employees provide the security controls necessary for the protection of people, property and proprietary information at SVTC facilities, and work with our partners to ensure they also use these controls to maintain confidentiality at our site.***

How:

What:



Key Elements of a Solar Development Center

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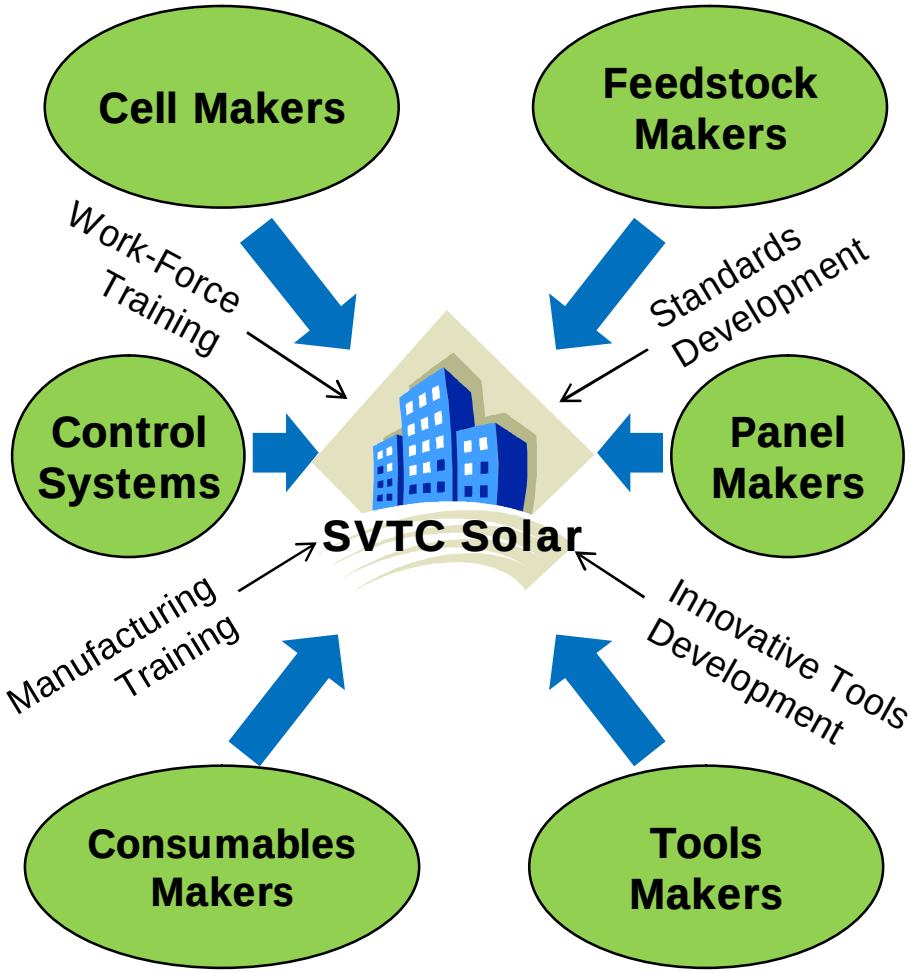
Support for entire PV food-chain



Status of SVTC Solar

- Facility leased in 2008
- Partnership with Roth & Rau announced
- Initial customers already running in CMOS fabs
- 30MW baseline tool installation scheduled for Q3’09
- Full operation in January, 2010

SVTC Solar

5215 Hellyer Avenue, San Jose Ca

Not Selecting “the winners”, but . . .

Benefits for companies doing product development:

- **Faster start-up, faster development, shorter time to market**
- **No up-front capital expense**
- **Significantly reduced operating expense**
- **Hands-on development**
- **IP independence and security**
- **Access to an unparalleled toolset for innovation (wafer, thin-film, CMOS, MEMs . . .)**
- **Access to experts in all aspects of solar development**
- **Access to pilot manufacturing**
- **Ability to focus on their unique innovations**

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