Envision digital

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QUALITY ROUNDTABLE

Stopping the blame game:
Managing quality and defining responsibility

Advanced Solar Analytics
Transforming Raw Data to Deep Insights and Actionable Outcomes

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Intersolar Munich

Kam Mofid, General Manager and Head of
Global Solar Center of Excellence

Envision Digital Corporation
Silicon Valley, California

Agenda

- Introduction to Envision
- The Journey Towards Advanced Analytics
- Envision Ensight™ Solar
- Discussions and Q&A

Envision Energy is a Global Leader in Renewable Energy Products and Solutions

- A Global Top 10 Wind Turbine OEM (#2 in China) and a Major Global Wind Project Developer
- Envision Digital has created EnOS™, World's Largest Energy IoT Platform Helping Manage over 100 GW of Solar and Wind Generation Assets; Comprehensive Solar and Wind Asset Management Software Solutions with Substantial Global Deployments
- Product Development, Engineering, and Sales Locations across US, Europe, and Asia with about 2000 Employees
- Envision Ventures (based in Silicon Valley) has Invested in a Number of Key "Digital Energy" Eco-System Companies

Comprehensive Yet Modular Solar and Wind Asset Management Solutions Residing on a Sophisticated Cloud-Based Big Data Platform

EnOS Solar/Wind

SaaS Application for Real-time M&C

Ensight

SaaS Application for Advanced Analytics

Forecaster

SaaS Application for Energy Forecasting

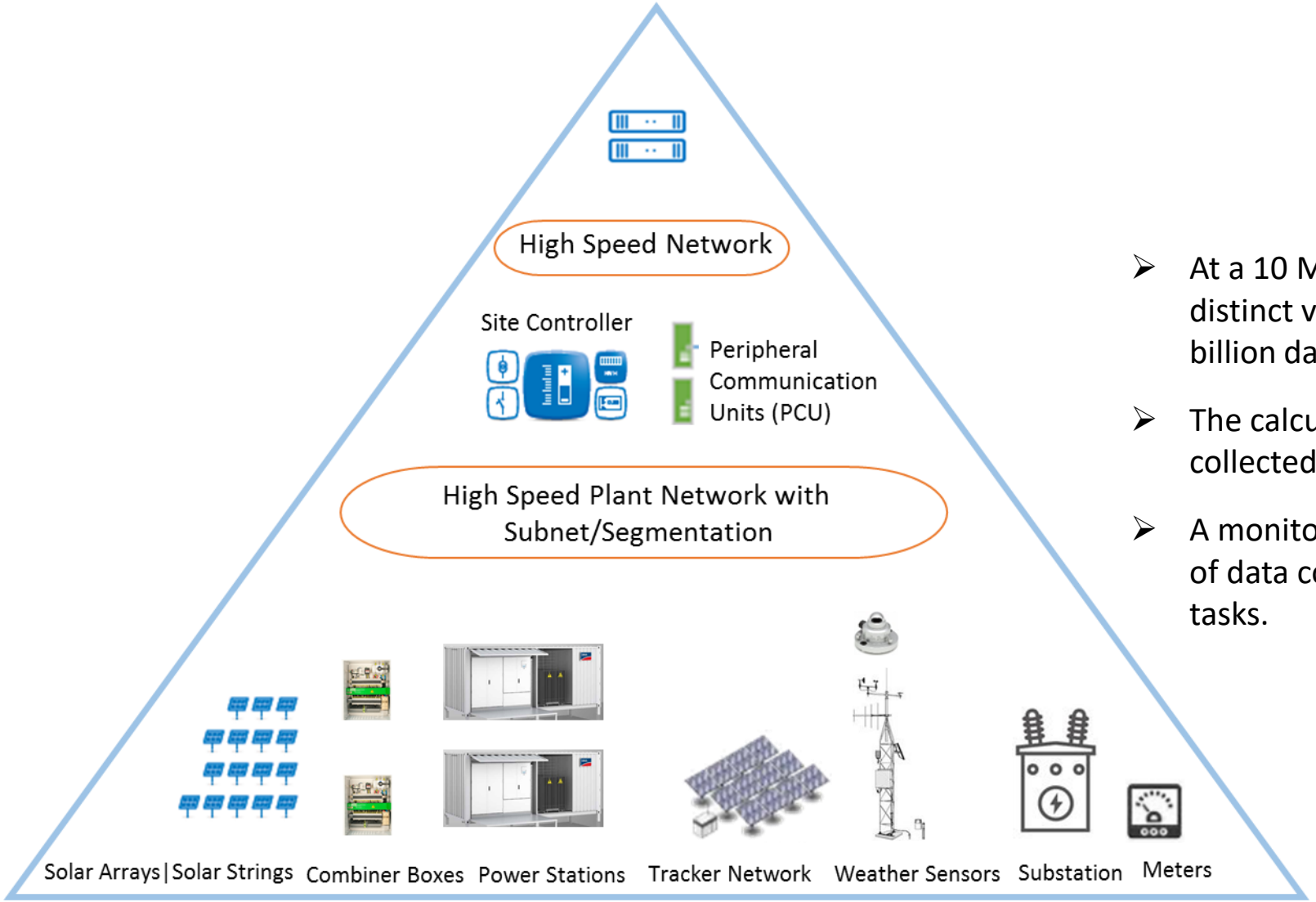
Third-Party Applications and/or Customers' Own Apps

EnOS Cloud-Based Big-Data Platform

USCADA / Edge Connectivity Solutions

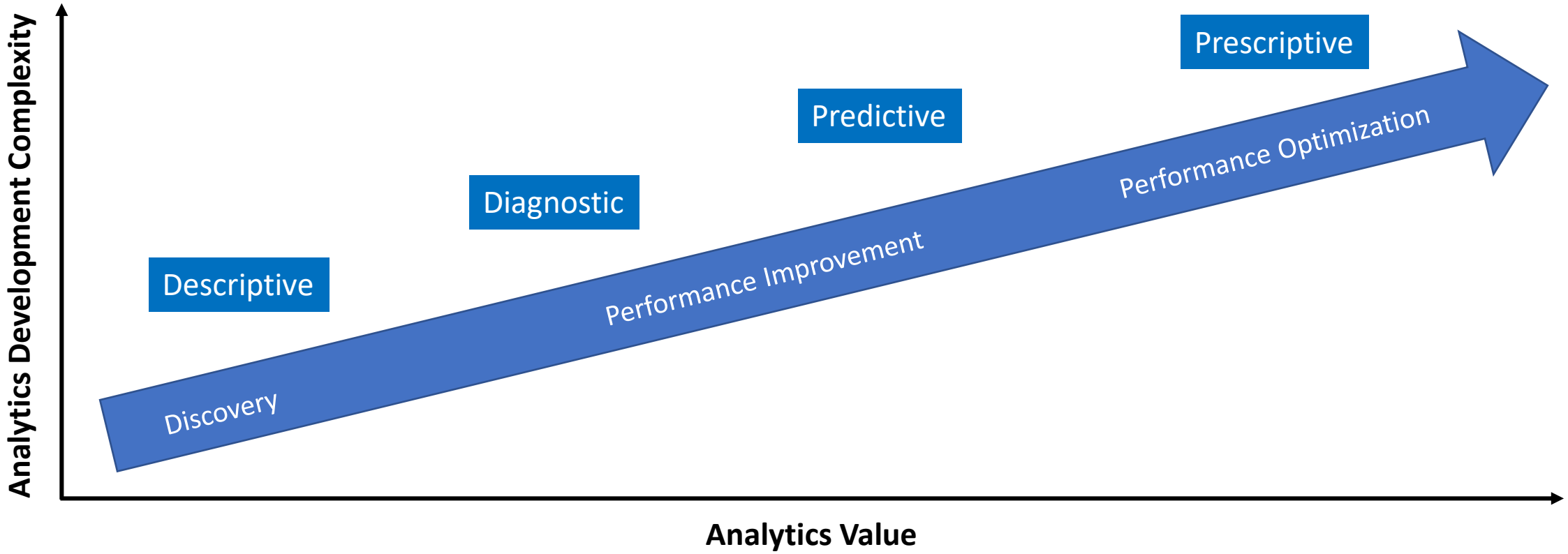
Utility-Scale Solar | DG Solar | Utility-Scale Wind | DG Wind | Energy Storage

Typical Larger C&I and Utility Scale Plants Generate Massive Amount of Data…



- At a 10 MW plant, for example, typically more than 5,000 distinct values are collected; at twice a minute → about 5 billion data points annually!
- The calculation of PR and TBA require only 0.5% of the tags collected on site
- A monitoring system user typically only uses less than 1% of data collected to accomplish typical plant monitoring tasks.

Four Key Types of Analytics – It is Not about Gathering More and More Data but About Looking Deeper and Deeper



- Envision Ensight™ only requires 5% of the amount of data collected annually by a monitoring system
- Envision Ensight™ can cover 75% of its features using only 0.5% of the amount of data collected annually

Envision Ensight – Highly Advanced Solar Analytics Software Suite

What is Ensight?

- Transforms raw data into business intelligence and actionable insights to increase plant revenues and decrease operating costs (i.e. maximize ROI).
- Provides a highly automated analytics platform to meet the needs of a broad set of industry participants

Product Features & Benefits

- Breaks out system losses into an industry-leading 15 loss categories with deep dives for each
- Identifies prioritized corrective action recommendations.
- Generates standard automatic monthly reports.
- Provide plant-based and fleet-level analytics.
- *Currently collaborating with DuPont on sophisticated analytics around module failure modes and predictions*

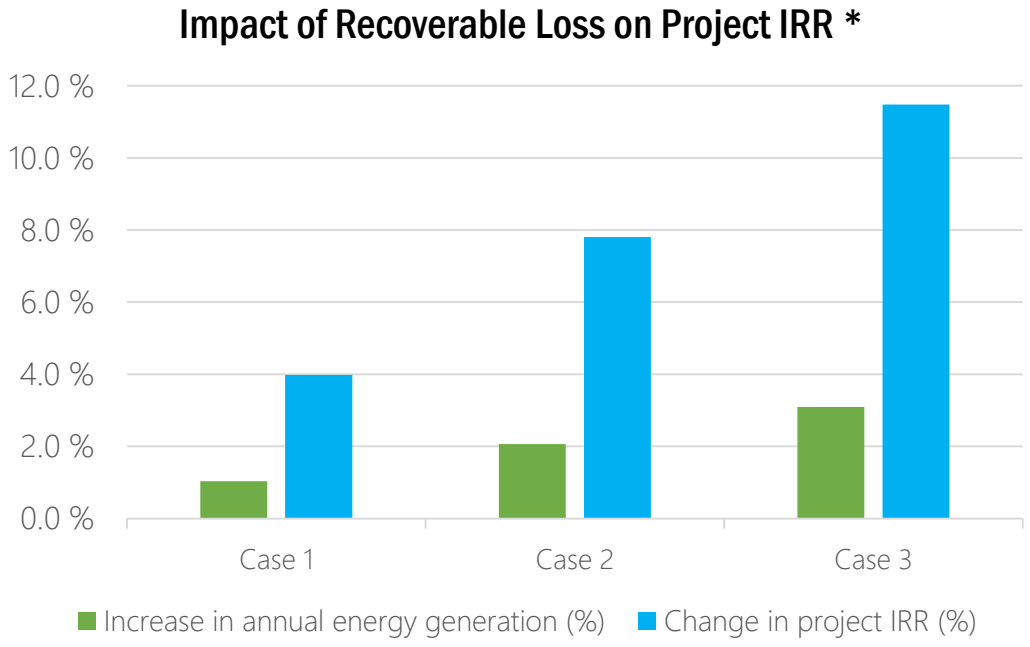
The Right Analytics can Enable Substantial Operational and Financial Performance Improvements…
Two Major Types of Use Cases: O&M Centric and/or Performance Optimization Centric

O&M-centric Use Cases:

- Internal O&M efficiency or external O&M compliance management including highlighting OEM and EPC obligations
- Typically around better understanding downtime categories, durations, and root causes
- Focus is usually on meeting certain performance baselines

Performance Engineering Paradigm:

- A paradigm shift from "good enough thinking" to "performance optimization thinking"
- Gaining much deeper insights into plant performance and future designs
- Energy recovery improvements can be substantial



* Calculated by NREL SAM: Representative 20 MW PV plant, 50 % debt, 20 year loan, 7¢ PPA, Arizona.