Intelligent Software Agents For Scheduling of Distributed Generation

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Alternative Energy Systems Consulting, Inc.

Gerald Gibson P.E.
Donald Pratt
Jamie Patterson (CEC)

Presentation Agenda

- ◆ *CEC-PIER Project Background*

- ◆ *What is an Intelligent Software Agent?*

- ◆ *Smart*DER Technology Description*

- ◆ *Smart*DER Demonstration*

- ◆ *Follow-on Project Wrap-up*

CEC-PIER Project(s) Background

California Energy Commission (CEC) - Public Interest Energy Research (PIER) Program Projects (CEC Program Manager: Jamie Patterson)

➤ "Intelligent Software Agents for Control and Scheduling of Distributed Generation" (CEC-PIER 500-98-040)

★ June 1999 - February 2001

➤ AESC recently began work on a follow-on contract for a demonstration field test during 2002.

➤ See www.SmartDER.com or www.aesc-inc.com for additional information.

Intelligent Software Agents?

An *agent* acts on behalf of another….

An *Intelligent* Agent

- ➤ Executes autonomously & operates in real-time
- ➤ Communicates with other agents or users
- ➤ Able to exploit domain knowledge
- ➤ Exhibits goal-oriented behavior

Agency Advantages:

- ➤ Multi-agent systems (a.k.a. Agency) allow distributed processing
- ➤ Agent complexity is kept low while agency intelligence is high
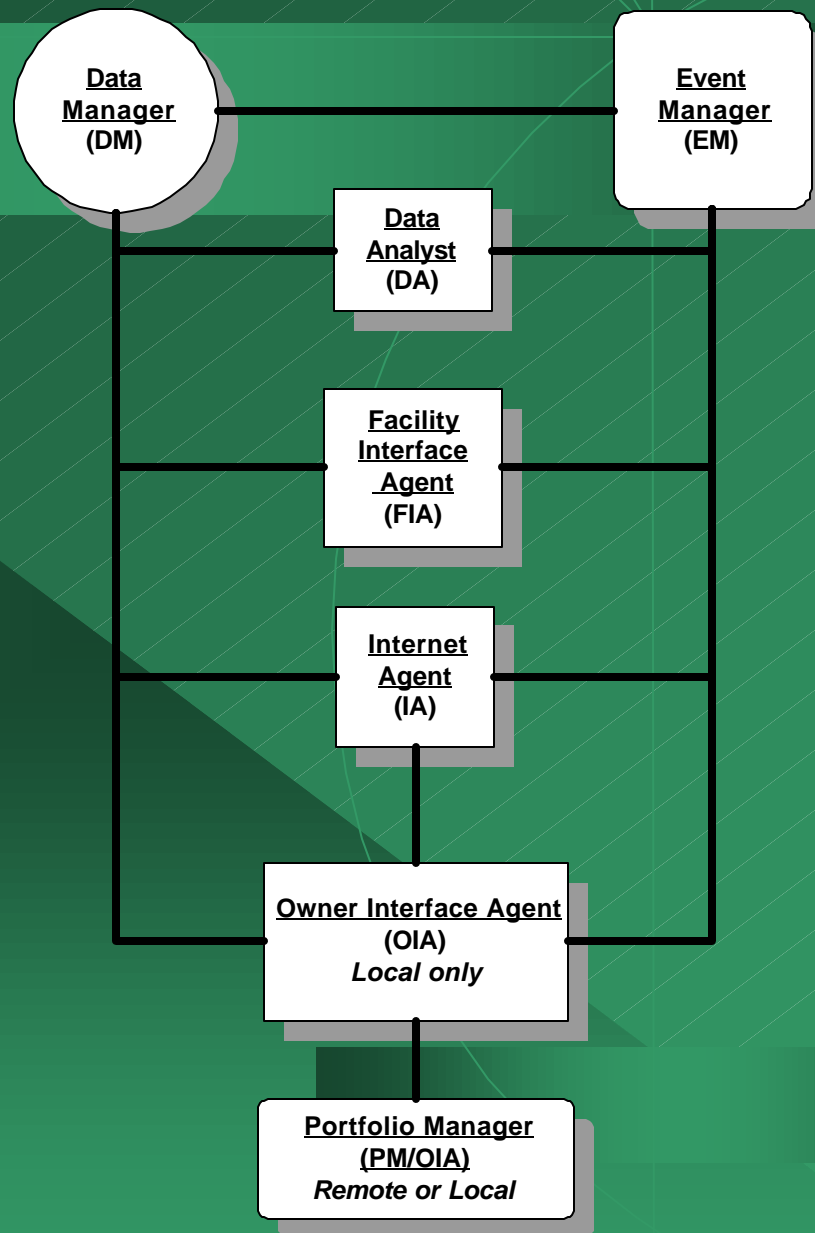- ➤ Agent-based solutions are more open and extensible

Why Use Intelligent Software Agents?

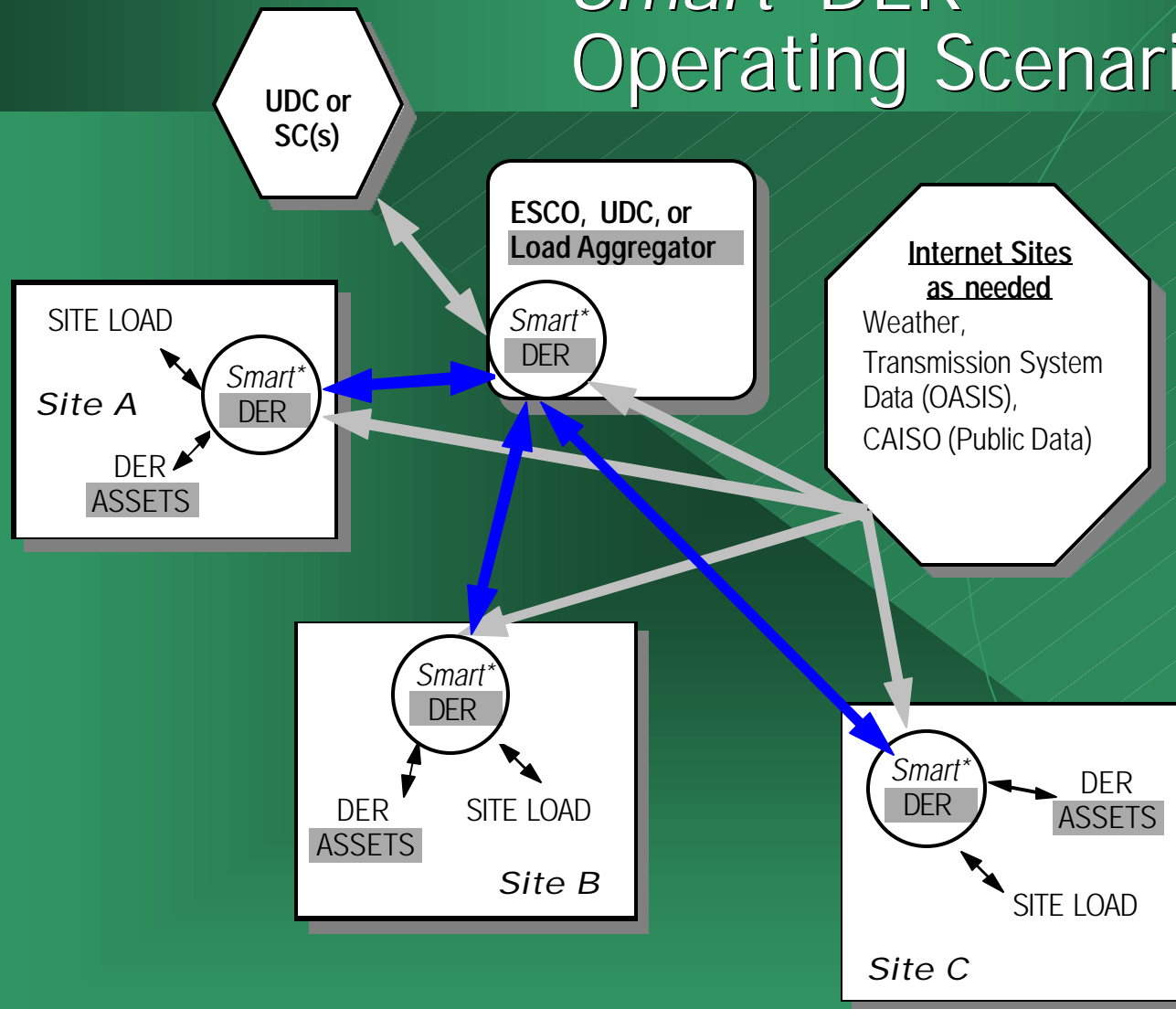Attributes of applications amenable to an agent based solution:

- ➤ An open / extensible solution is needed
- ➤ Location specific knowledge and decision-making is involved
- ➤ Information is needed from a variety of sources
- ➤ Communication / collaboration between sites is needed
- ➤ A dynamic decision-making environment exists
- ➤ Local expertise is inadequate or inconsistent to handle the day-to-day decision making

*Smart*DER Agency

Data Manager (DM)

Event Manager (EM)

Data Analyst (DA)

Facility Interface Agent (FIA)

Internet Agent (IA)

Owner Interface Agent (OIA) *Local only*
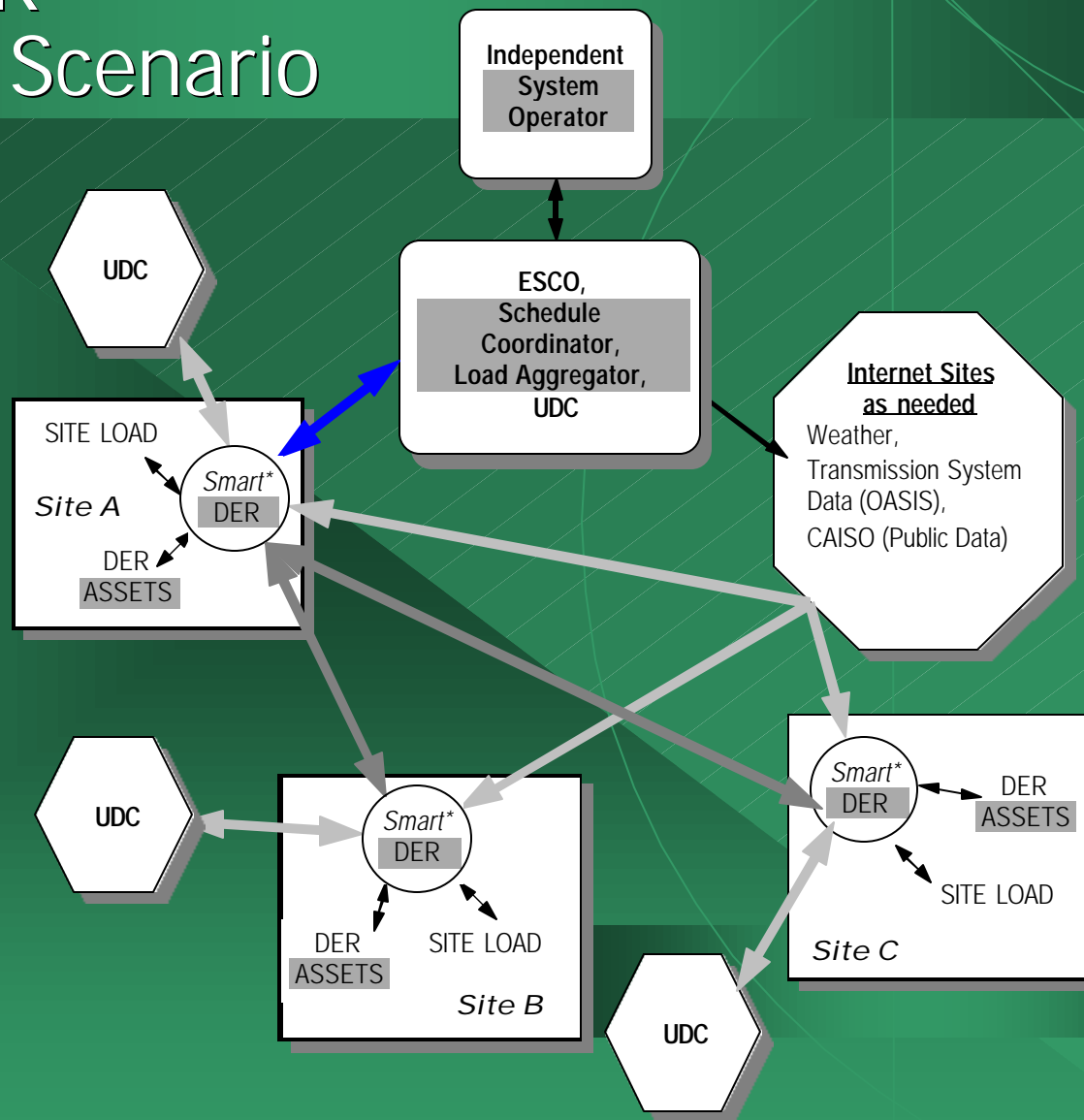
Portfolio Manager (PM/OIA) *Remote or Local*

- ◆ Task analysis yielded seven independent agents, each devoted to a single aspect of the scheduling / aggregation process

- ◆ Java based code & Internet-based communications

- ◆ Individual agents can be located on the same or multiple platforms

Smart*DER
Operating Scenario

UDC or SC(s)

ESCO, UDC, or Load Aggregator

Smart DER

Internet Sites as needed
Weather,
Transmission System
Data (OASIS),
CAISO (Public Data)

SITE LOAD

Smart DER

Site A

DER ASSETS

Smart DER

DER ASSETS

SITE LOAD

Site B

Smart DER

DER ASSETS

SITE LOAD

Site C

Smart*DER
Operating Scenario

Smart*DER
Demonstration Software

◆ **Demonstration software was developed as part of the initial CEC-PIER project to facilitate technology transfer.**

◆ **Demo Software Uses:**

➤ CAISO & CalPX price data for 1999 calendar year

➤ San Diego area weather data & generic commercial, industrial and residential load profiles (SDG&E)

◆ **Today's Simplified Demo Example**

➤ Single Large Commercial Site / Two Generation Assets

➤ Unit Operation Options Include:

No operation, Operate to displace site load, Sell capacity into CAISO AS market (NSPIN, RR) then Operate to supply AS if called

Follow-on
Project Description

During the on-going follow-on project AESC is:

➤ Updating *Smart**DER product requirements based on changes in the California energy marketplace.

➤ Enlisting participation by one or more potential commercialization partners & demonstration sites

➤ Refining *Smart**DER technology

➤ Planning to use *Smart**DER technology for DER scheduling in "real world" applications both inside and outside of California during 2002.

AESC is actively seeking demonstration sites both inside and outside of California for participation in the 2002 field test. Contact Jerry Gibson at gibsonj@aesc-inc.com.