Event-Driven Architecture:
SOA Complement and Peer

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Today's Discussion

- **Event Driven-Architecture**

- **The SOA-EDA Relationship**

- **Event Basics: Events, Processing Styles, Flows**

- **The Power of Event-Driven Architecture**
  - **Business-Based Event Flow Examples**

- **But First, a Little Context Setting…**

Context / Disclosures

1. **Architect's Point-of-View**

2. **Advocate "Business-Driven Architecture"**

   – **The most viable, agile architectures will be comprised of a blend of architecture strategies, including (but not limited to):**

      • **Service-Oriented Architecture**
      • **Event-Driven Architecture**
      • **Process-Based Architecture/Business Process Management**
      • **Federated Information**
      • **Enterprise Integration**
      • **Open Source Adoption**
      • **Grid Architecture**
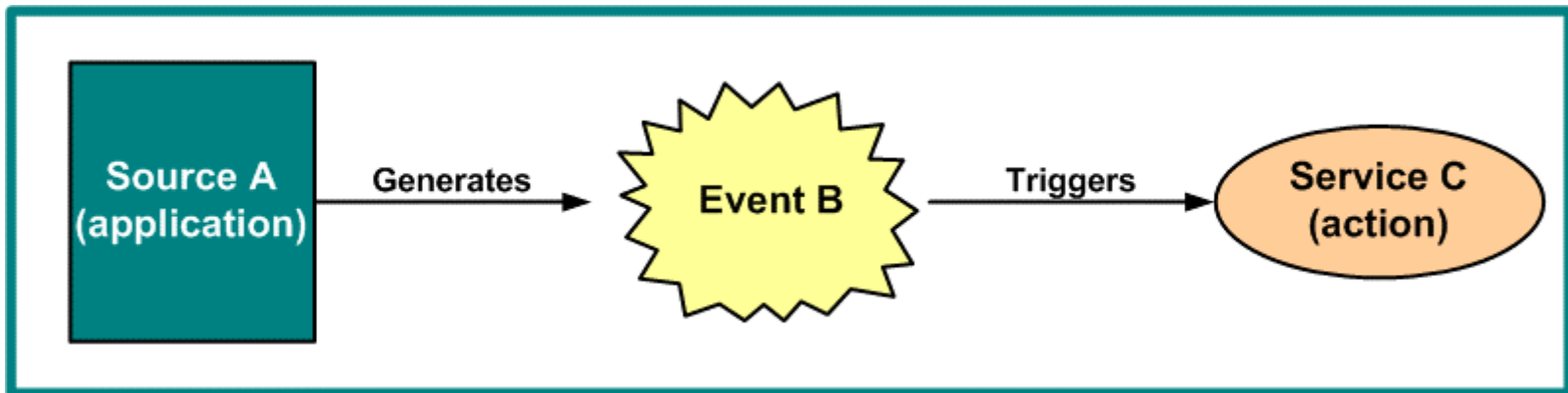
   – **How you blend, depends on your business.**

EDA Basics: What is Event-Driven Architecture?

- **In an event-driven architecture, an ordinary or notable thing happens inside or outside your business, which disseminates immediately to all interested parties (human or automated).**

- **The interested parties evaluate the event, and optionally take action.**

- **The event-driven action may include the invocation of a service, the triggering of a business process, and/or further information publication/syndication.**

  - **The downstream information subscribers/recipients also evaluate and act, and the flow continues…**

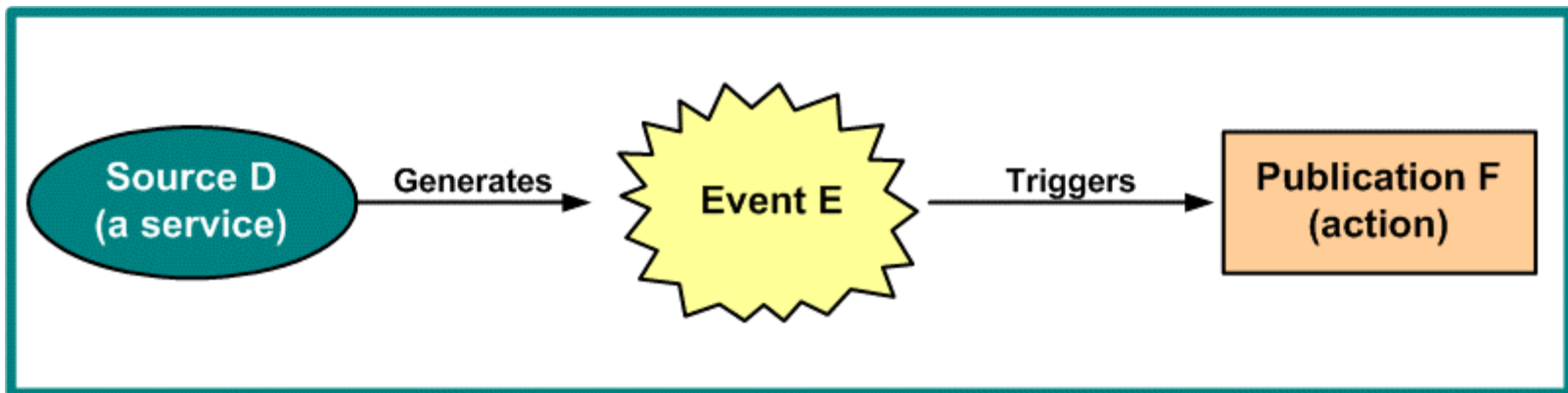# The SOA-EDA Relationship: Complements & Peers

Interaction #1: Event-Driven SOA

- The occurrence of an event (an ordinary or notable thing that happens inside or outside your business) can trigger the invocation of one or many services.

- Those services may perform simple functions, or entire business processes.

Interaction #2: Service as Event Source

- **A service generates an event. That event may signify a problem or impending problem, an opportunity, a threshold, or a deviation.**

- **The event is immediately disseminated and evaluated for possible downstream actions:**

  - **Service invocation, business process execution, and/or further information publication/syndication.**

Source D (a service) → Generates → Event E → Triggers → Publication F (action)

SOA and EDA Relationship

Complements:

- **A Service can play the role of event source or target**
  - **A service is just <u>one of many</u> event sources/targets**

- **An event-driven architecture can be implemented using service-orientation:**
  - **event generation services, event processing services etc.**
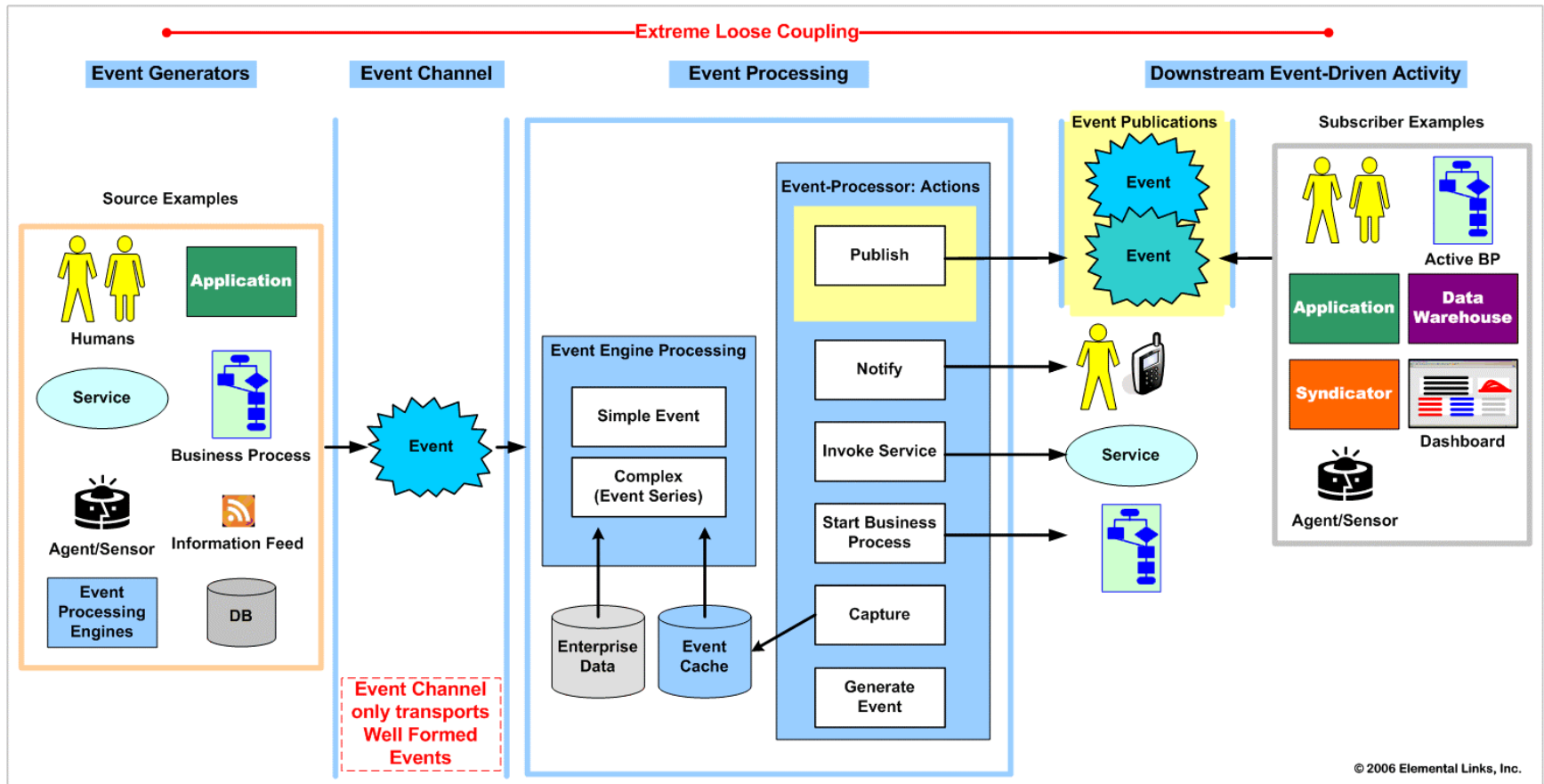
Peers:

- **Event-driven architecture stretches beyond event-driven SOA, to include real-time information flow and analysis, and complex event processing.**

Let's take a closer look at Event-Driven Architecture…

What is Event-Driven Architecture?

The Basics: 10k Feet, Processing Styles, Flows

EDA Basics: What does EDA look like?

EDA Basics: 3 Event Processing Styles

1. Simple Event Processing:

- **A notable event happens, initiating downstream action(s).**

- **Simple event processing is commonly used to drive the real-time flow of work -- taking lag time and cost out of a business.**

2. Stream Event Processing:

- **Notable and Ordinary events happen. Ordinary events represent business as usual – orders, RFID transmissions, etc.**

- **Ordinary events may be locally pre-screened for notability and/or applicability, prior to being released into the general event stream.**

- **Stream event processing is commonly used to drive the real-time flow of information in and around the enterprise—enabling in-time decision making.**

EDA Basics: 3 Event Processing Styles
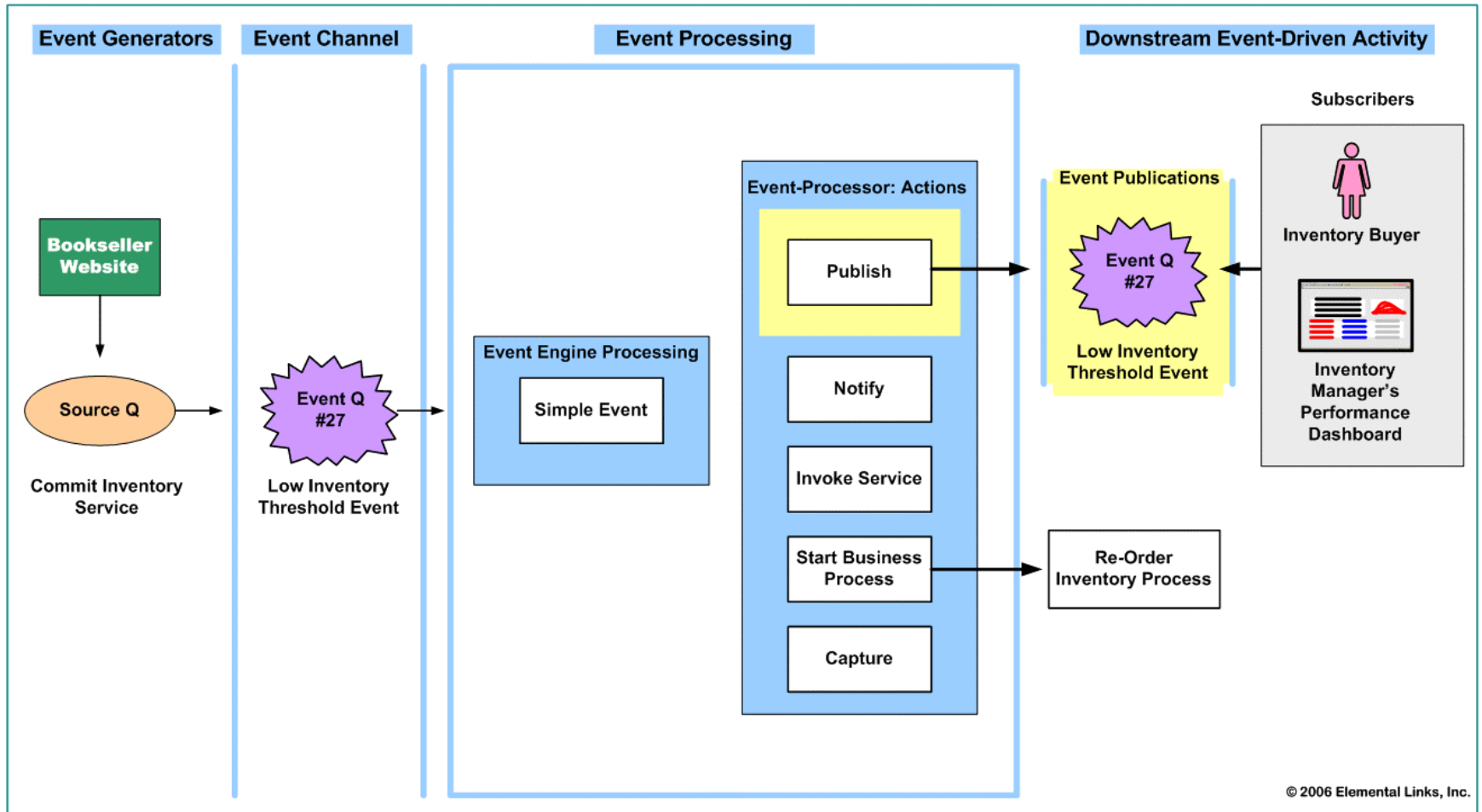
3. Complex Event Processing:

- **CEP deals with evaluating a confluence of events and then taking action.**

- **The events (notable or ordinary) may cross event types and occur over a long period of time.**

- **The event correlation may be casual, temporal, or spatial.**

- **CEP is commonly used to detect and respond to business anomalies, threats, and opportunities.**
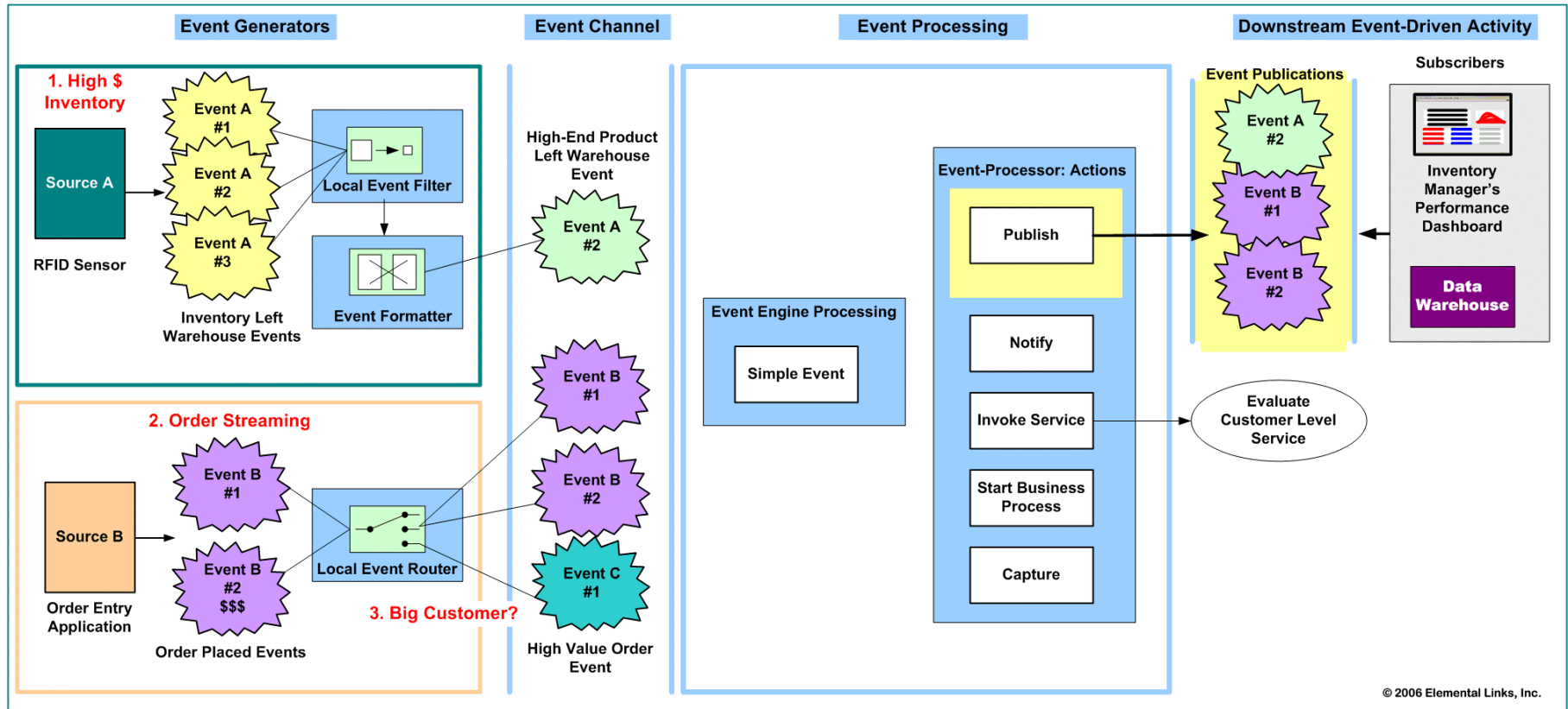
Note: A mature EDA combines the three styles.

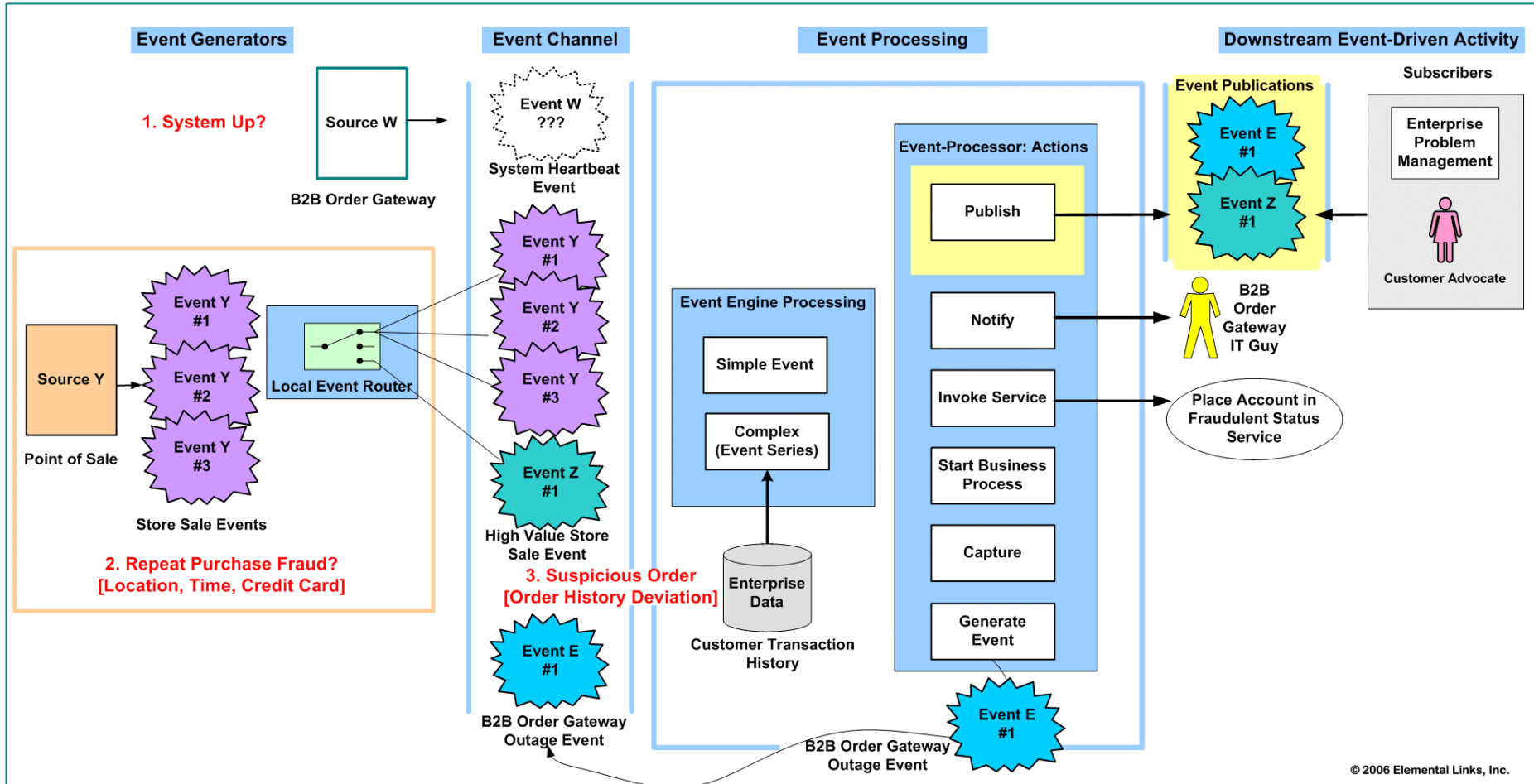# The Power of Event-Driven Architecture

Business-Based Event Flow Examples

Simple Event Processing: Inventory Optimization

Event Generators | Event Channel | Event Processing | Downstream Event-Driven Activity

- Bookseller Website → Source Q
  - Commit Inventory Service
- Event Q #27 — Low Inventory Threshold Event
- Event Engine Processing
  - Simple Event
- Event-Processor: Actions
  - Publish
  - Notify
  - Invoke Service
  - Start Business Process → Re-Order Inventory Process
  - Capture
- Event Publications
  - Event Q #27 — Low Inventory Threshold Event
- Subscribers
  - Inventory Buyer
  - Inventory Manager's Performance Dashboard

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Stream Event Processing: Multi-Channel Retailer, 3 Flows

CEP: Multi-Channel Retailer, 3 Flows

EDA: The Power

- The **inherent flexibility** at each layer—what events are generated, how they are processed, and who receives them—is the real power of event.

- **Mix and Match**: Services, Events and Business Processes

- Instantiates **Business Interactions**: Real-Time Flows of Work and Information

- **Extreme Loose Coupling**

Questions? Comments?

Thanks for your time!

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Backup Slides

SOA Terminology

- **A SERVICE is a thing that fulfills a purpose. A service is, in essence, a "worker," employed to achieve a specific end goal for a requester. The end goal may be small in scope, such as retrieving information, or large in scope, such as executing a business process. Most services are in the middle, completing a function. The scope of a service is referred to as its grain, or level of granularity.**

- **What Kind of Thing is a Service? A service is an abstract resource that has a name, a job, job tasks, contact information, and policies regarding security and service levels. To use (request) a service, you send a message—in accordance to the contact information and policies—and then (if appropriate), receive a reply message.**
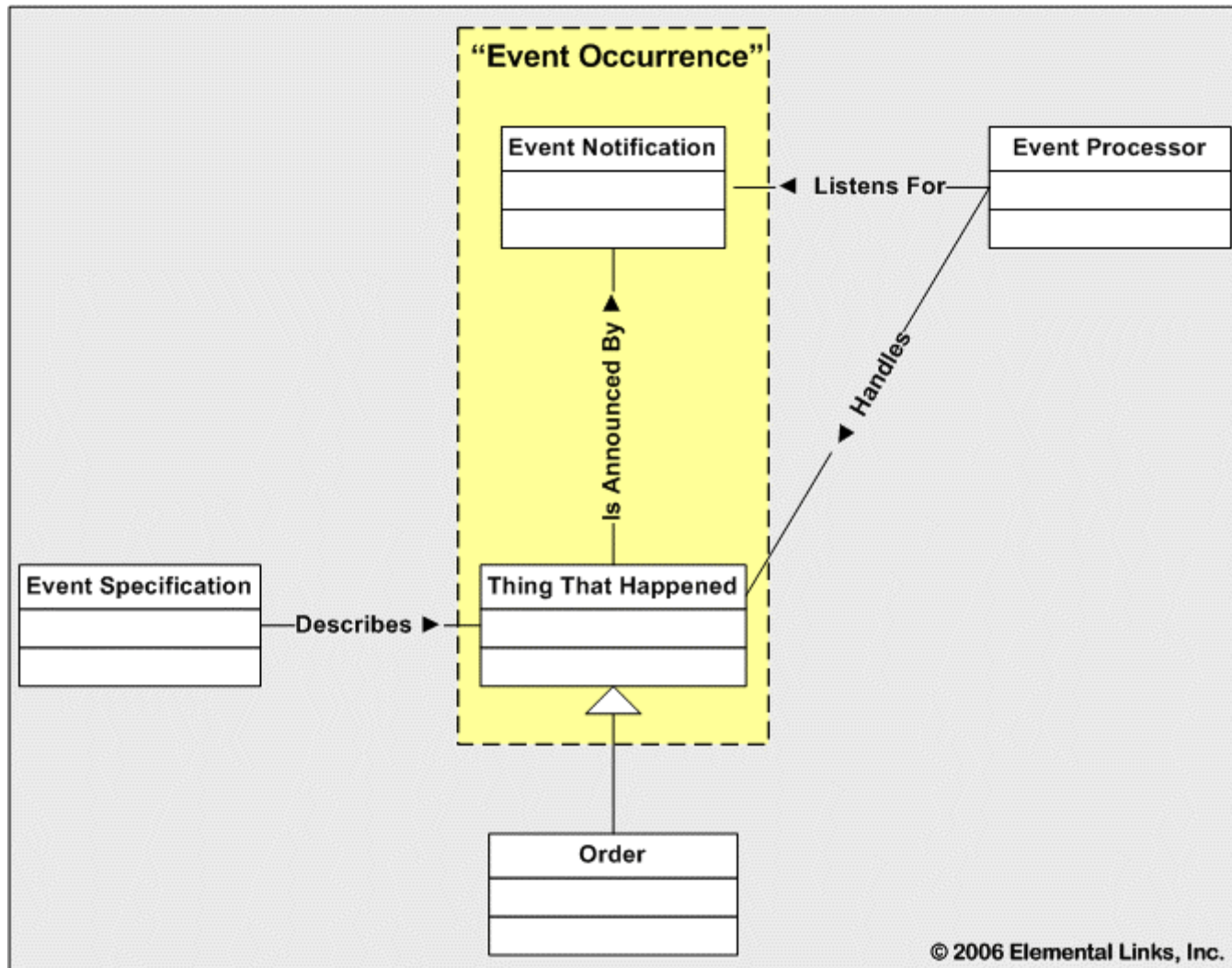
SOA Terminology

- **A Service's Job. The job of a service is limited to a single distinct business concept, function, or process. This characteristic is referred to as the bounds of a service. Finding the correct bounds is a key factor in service definition. A service may call upon other services if it needs assistance to complete its job. This service-to-service relationship is called collaboration.**

- **Orchestration is a type of collaboration in which the primary service directly invokes other services. The primary service knows the sequence of actions and the interfaces, responses, and return states of the called services.**

SOA Terminology

- **SERVICE ORIENTATION** is an architectural concept that refers to the loose coupling of a service (an abstract resource with a defined job) and its provider (the physical asset(s) that perform the job tasks). A requestor only knows what the service's job is and how to request it. The service is the only one that knows its implementation.

- **SOA** is an IT architecture strategy for business solution (and infrastructure solution) delivery based on the concept of service orientation.

Event Occurrence: Thing & Notification

EDA Basics: What is an Event?

- **An event is a [*notable*] thing that happens inside or outside your business.**

- **An event (business or system) may signify a problem or impending problem, an opportunity, a threshold, or a deviation.**

- **Events have specifications (definitions) and individual occurrences (instances).**

- **Events are defined in Business Terms:**
  - **YES: Product Liquidation Event**
  - **NO: Product Status Change Event**

- **Event occurrences are fully described:**
  - **Downstream processors, targets and subscribers should not have to query source systems and databases**

EDA Basics: What does an Event Look Like?

```xml
−<event>
  −<eventHeader>
      <eventSpecificationId>1</eventSpecificationId>
      <eventType>Low Inventory Threshold</eventType>
      <eventClass>Business</eventClass>
      <eventSubClass>Threshold</eventSubClass>
      <eventOccurrenceId>4019</eventOccurrenceId>
      <eventTimeStamp>2006-26-06 13:42:00:01</eventTimeStamp>
      <eventSource>Inventory Monitor</eventSource>
  </eventHeader>
  −<eventBody>
      <sku>12345678</sku>
      <productName>A Good Book</productName>
      <currentInventory>12</currentInventory>
      <lowThreshold>15</lowThreshold>
      <highThreshold>75</highThreshold>
      <reorderAmount>42</reorderAmount>
  </eventBody>
</event>
```

EDA: Some Challenges

- **High distribution, dynamic multi-path environment brings traceability and management challenges.**

- **Easily Create an Information Deluge – Both for People and Infrastructure**

- **Lack of Standards (Interoperability)**
  - **Event Specification**
  - **Event Processing Notation/Languages**
  - **Business Event Lexicon**
  - **[More…]**

- **"SOA Mania" Marketplace Confusion: SOA, EDA, BPM**