

# Gain new 'Insight' with ODM Advanced's Event Processing Capabilities

**Operational Decision Manager Advanced for z/OS**



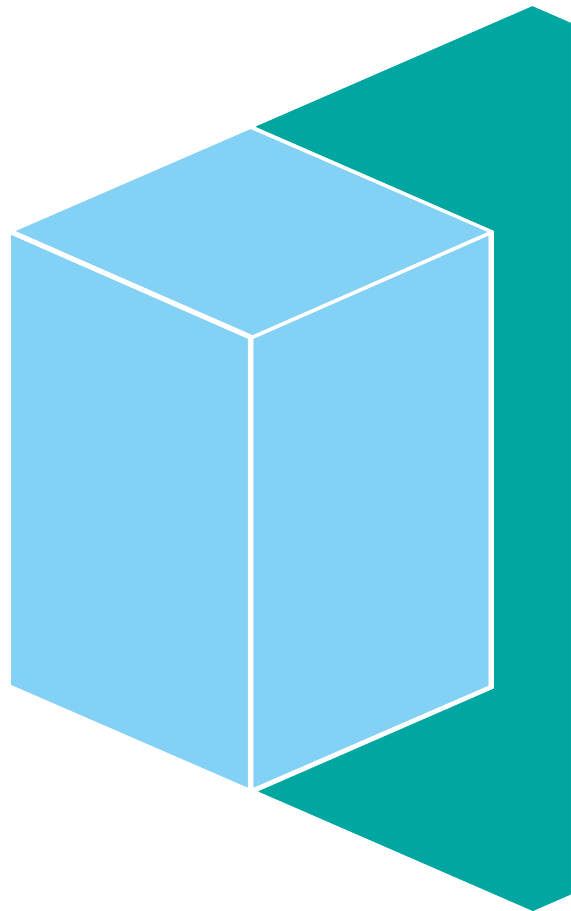
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# We live in a moment of enormous possibility and digital transformation



**90%**

Of the world's data created in the last two years.



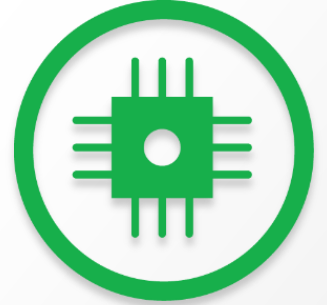
**4x**

Increase in key business investments in Cloud over 2013.



**100%**

Of LOB apps will be built for mobile-first by 2017.



**75B**

Devices connected to the internet by 2020.

Alone, each of these has immense potential. Together, they can **change everything.**

# This digital transformation drives our imperatives



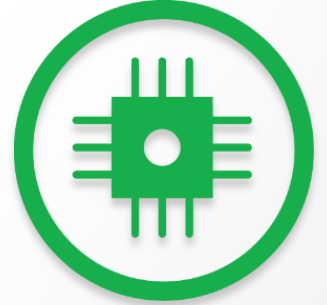
**90%**  
**Act in context**  
Of the world's data created  
with data  
in the last two years.



**4x**  
**Drive simplicity and**  
Increase in key business  
**speed with Cloud**  
investments in Cloud over  
2013.



**100%**  
**Accelerate customer**  
Of LOB apps will be built for  
**engagement**  
mobile-first by 2017.



**75B**  
**Digitize the**  
Devices connected to the  
**physical world**  
Internet by 2020.

# This digital transformation drives our imperatives



Actionable Insights & Cognitive Decisions



Actionable Insights &  
Cognitive Decisions



Drive Cloud First and



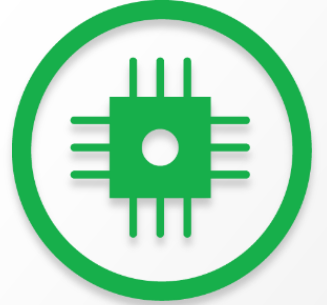
Hybrid Cloud First



Accelerate Customer



Decision Management



Actionable Insights &  
Cognitive Decisions

# Decision automation now available in 2 flavors



## Transactional Decisions

- Invoked in context of a business process or application (request / reply)
- Use data from transactional records
- Stateless decisions
- Interactive or batch

DECIDE

Decision Server Rules

Whatever my action,  
you are ready to respond

## Situational Decisions

- Triggered by multi-channel interactions (event-driven)
- Use business event history, business context and analytics
- Stateful decisions over a context built over time
- At the earliest actionable moment (real-time)

DETECT & DECIDE

Decision Server Insights

Whatever my next step,  
you have anticipated my needs

# IBM Operational Decision Manager: Offerings

## IBM ODM Advanced

**New**

- To capture events, build context, and apply it to operational decisions in real-time
- To detect situations as they occur – presenting risks or opportunities – to enable action

***Situation* Driven  
Decision Automation**

## IBM ODM Standard

- To adapt the decision logic of applications at the pace of business
- Visibility into, control over, and automation of point-in-time business decisions

***Request* Driven  
Decision Automation**

# Detect Business Situations in context

IBM ODM Advanced

## Without



Equipment sensors  
identify a malfunction



Manual Paperwork and  
stakeholder discussions to  
deploy a technician and fix the  
problem



Operations suspended, leading  
to loss of time and revenue

## With



Collect  
sensor  
data



Apply historical  
repair data



Maintain and use context to  
build insights



Failure is Imminent



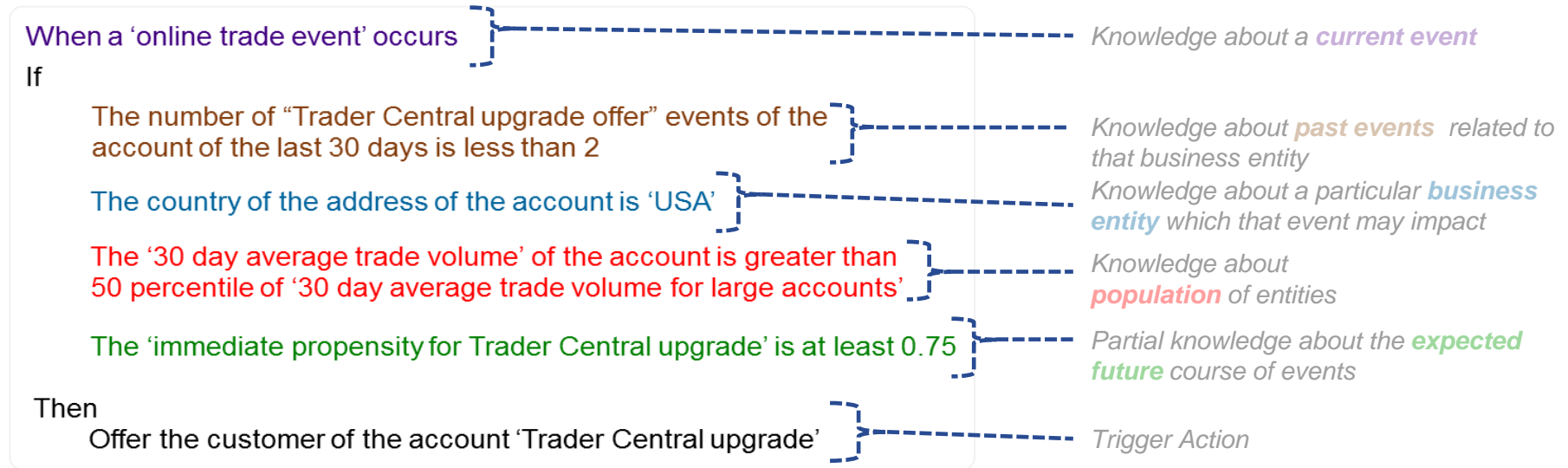
Operational  
Decisions



...identify opportunities for  
preventative maintenance. Time  
and resources saved.

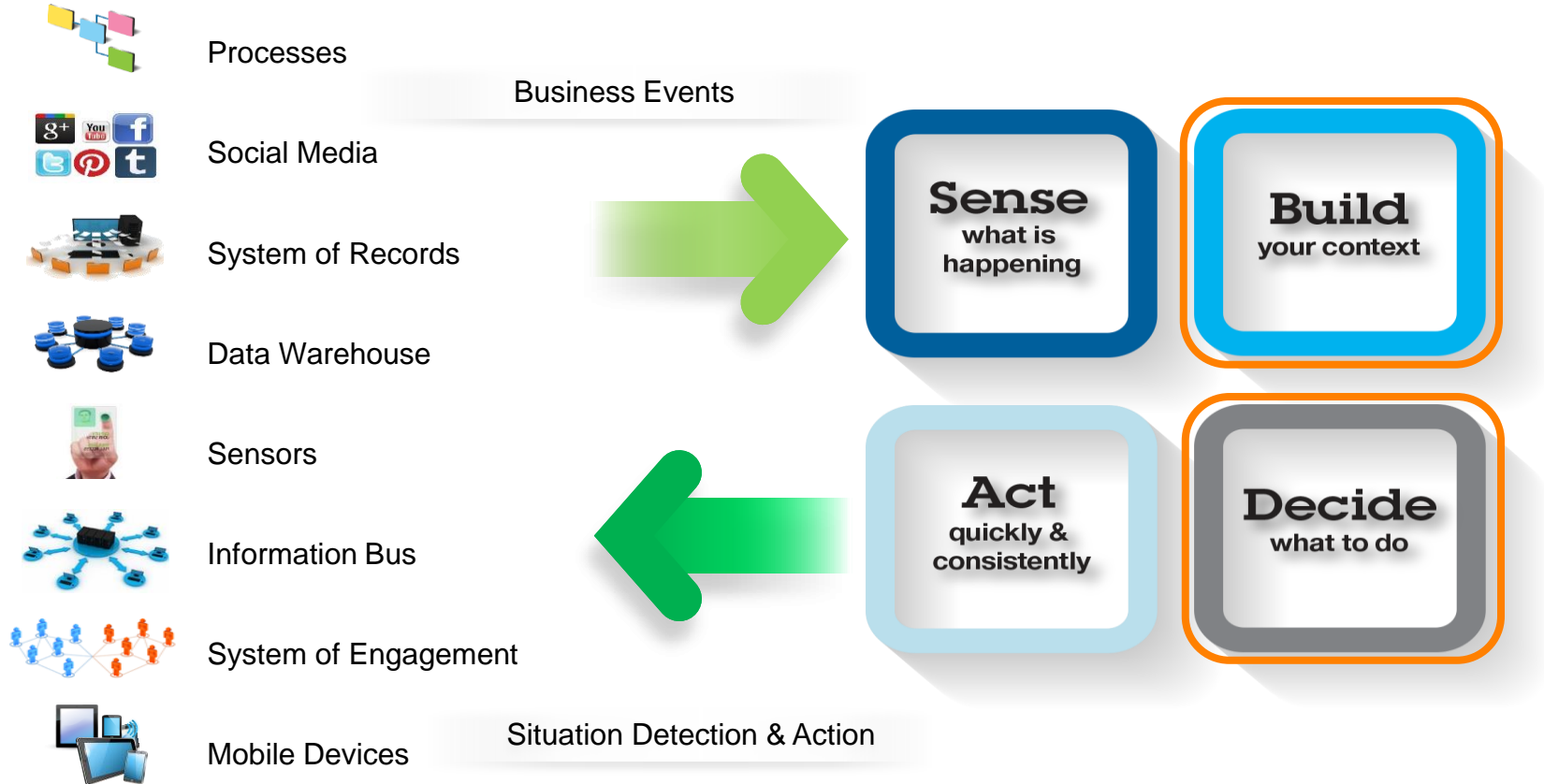


# Simple Context Building in one single rule



Building a decision context aggregating disparate knowledge source has never been so simple

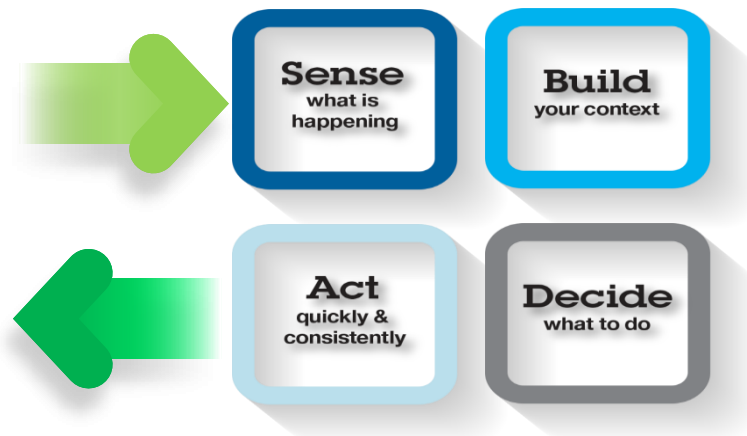
# Four Steps toward decision making in context



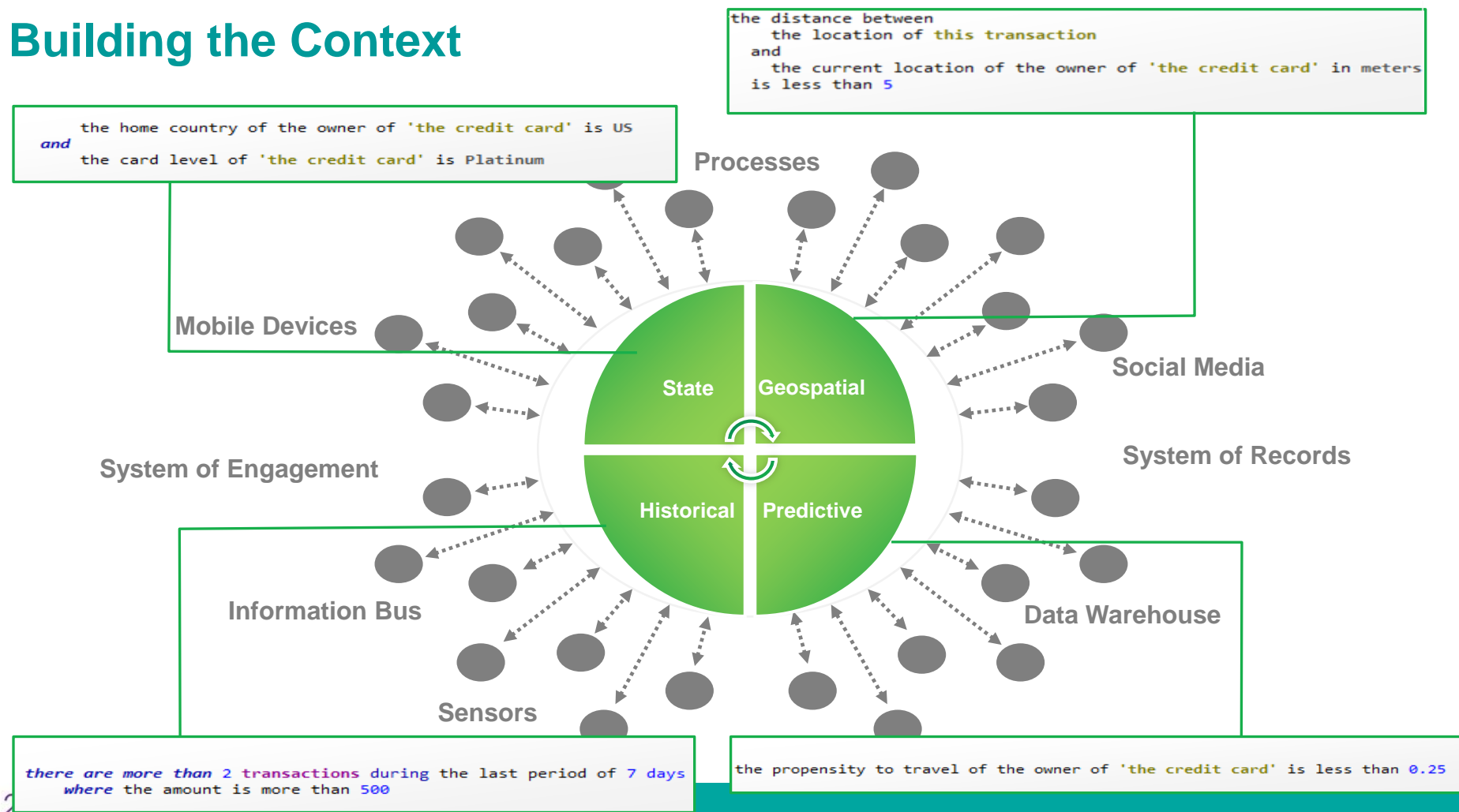
# Decision Server Insights

*Decision Server Insights* wraps *business rules, events, predictive* and *real-time analytics* in an integrated, easy to operate, elastic platform.

Allows continuous analysis and optimized decisions at the time of interaction leveraging *the enterprise's up-to-date analytic models and business policies.*



# Building the Context



# Combining Events, Rules and Analytics for more Cognitive Decisions

## Leverage Predictive Analytics



Invoking Predictive Scoring Engine

Predictive Model continuous training

*Aggregates specified in ODM, maintained in Streaming Analytics, used as Predictors for Scoring*

## Combine with Streaming Analytics



Multi-stage event processing

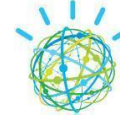
Fast aggregation front-end

Invoke Decisions in stream nodes



Policies

## Cognitive Decisions



Leveraging Watson

Leverage various analytics

(anomaly detections, sentiment, text analysis, Entity relationship, geospatial...)

**Local / Global Programming Model:**  
Decision in Context, aggregates on a Population

## « Big Decisions »



Apply decisions in batch big data

Analytics in Hadoop / Spark

Business Simulation at scale

Decision Analytics with business KPIs

Global Aggregates



Events



System of Records



# Core Building Blocks



## Entity

Some business relevant thing and related information



## Event

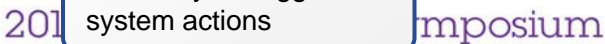
Message representing something that happened



## Agent

Business logic that is applied to an incoming event

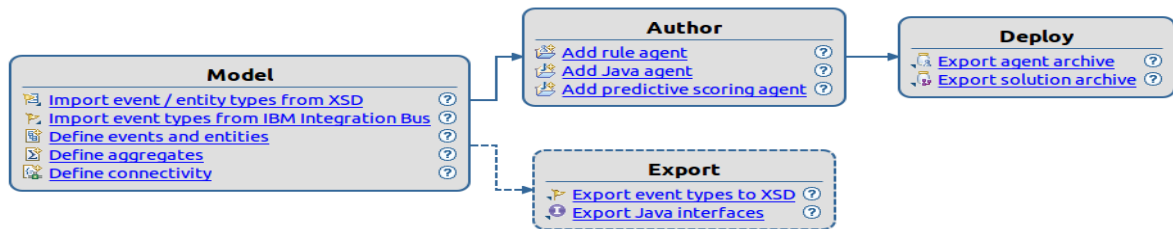
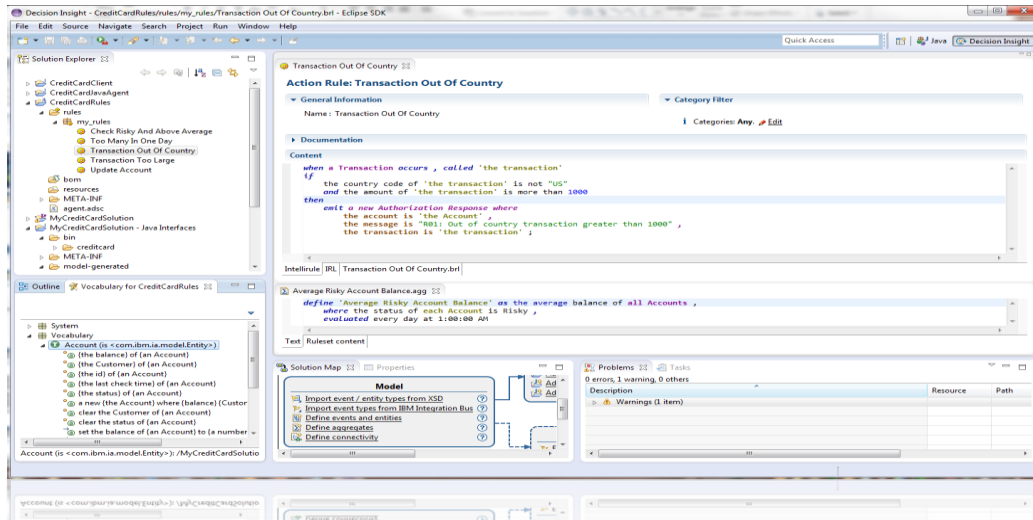
201 system actions



# Insights Designer

*Single environment to manage events rules and SPSS*

- **Dedicated eclipse perspective**
- **Model design through intuitive natural language editors**
- **Solution map provides step-by-step assistance for starting up new insights projects**





# Model Entities

- Entities are used to support the business model
- Entities have an identifier and their own lifecycle.

*a car is a business entity identified by a vin with  
a make,  
a model,  
a year (integer).*

*a car is related to a policy.*

*a customer is a business entity identified by an email with  
a first name,  
a last name,  
an address,  
a mobile number,  
a sex.*

*clear and suspect are fraud statuses.*

*a policy is a business entity identified by an id.  
a policy has a start (date & time).  
a policy has an end (date & time).  
a policy is related to a car.  
a policy is related to a customer.  
a policy has a fraud status.*

# Model Events

- Used to describe what happens or can happen
- Events are the representation of messages that are coming from the outside world
- Events have a time of occurrence

*a policy purchase is a business event time-stamped by*  
a date (date & time) with  
a start (date & time),  
a end (date & time).

*a policy purchase is related to a car.*  
*a policy purchase is related to a customer.*  
*a policy purchase is related to a policy.*

*a policy cancellation is a business event time-stamped by*  
a date (date & time).  
*a policy cancellation is related to a policy.*  
*a policy cancellation is related to a customer.*

*a vehicle event is a business event time-stamped by*  
a date (date & time).  
*a vehicle event is related to a car.*  
*a vehicle event is related to an incident.*  
*a vehicle event has an address.*

*an accident is a vehicle event with*  
a severity.

*a recovery is a vehicle event with*  
a cost (numeric).

*a repair is a vehicle event with*  
a cost (numeric),  
a dealer.

# Agent Implementation

Describe the Bound Entity and Subscribe to Events of interest

'car agent' is an agent related to a car,  
processing events :  
- accident, where this car comes from the car of this accident

Implement business logic processing the Events:

- In Java or Business Rules

```
when an accident occurs
if
  the severity of this accident is fatal
or the severity of this accident is injury
then
  emit a new ambulance call where
    the address is the address of this accident ,
    the car is 'the car' ,
    the customer is the customer of the policy of 'the car' ,
    the date is the date of this accident ,
    the description is "Ambulance required: accident/injury acci
  emit a new police call where
    the address is the address of this accident ,
    the car is 'the car' ,
    the customer is the customer of the policy of 'the car' ,
    the date is the date of this accident ,
    the description is "Police required: accident/injury accident"
```

```
package demo_java_agent;

import com.ibm.ia.common.AgentException;
import com.ibm.ia.agent.EntityAgent;
import com.ibm.ia.model.Event;

import demo.*;

public class MyJavaAgent extends EntityAgent {

    @Override
    public void process(Event event) throws AgentException {

        AmbulanceCall ambulanceCall = (AmbulanceCall) event;
        Car car = (Car) getBoundEntity();
        if( car.getMake() == Make.BMW && ambulanceCall.getAddress().getCity().equals("London")) {
            Notification notification = getEventFactory().createEvent( Notification.class );
            notification.setMessage( "London BMW driver needs an ambulance." );
            submit( notification );
        }
    }
}
```

Interfaces  
generated from model

# Decision Server Insights rule examples

## Detect a Risk

```
when a transaction occurs
  where the location is not the home country of the owner of 'the credit card'
definitions
```

```
  set 'out of country transactions' to all transactions
    where the location is not the home country of the owner of 'the credit card' ;
```

```
if
```

```
  the propensity to travel of the owner of 'the credit card' is less than 0.25
```

```
and
```

```
  there are more than 2 transactions in 'out of country transactions' during the last period of 2 days
```

```
and
```

```
  the average amount of 'out of country transactions' is more than 500
```

```
then
```

```
  emit a new fraud alert where
    the customer is the owner of 'the credit card' ,
    the fraud level is Medium ,
    the message is "Out of Country Fraudulent Use" ;
```

Location Awareness

Scoring

Correlation

Aggregation

Response

## Size an opportunity

```
when a credit card activated event has occurred 7 days ago
```

```
if
```

```
  the home country of the owner of 'the credit card' is US
```

```
and
```

```
  ( there is no transaction during the last period of 7 days
```

```
    or
```

```
    the average amount of all transactions during the last period of 7 days
      is less than 'Average Last Week Transaction Amount' )
```

```
then
```

```
  emit a new offer where
```

```
    the customer is the owner of 'the credit card' ,
    the offer type is Discount ,
    the message is "We offer you a 10% discount" ;
```

# Insight Designer — Shared aggregates

- **Three types of event aggregates**

- **Local**; **Shared**; **Global**

- **Shared aggregates**

- Aggregates events that are associated with an entity
  - Events that are subscribed independently from agents
  - Usable from any agent — local or remote to the entity
  - Values can be used in rules to evaluate conditions and make decisions

- **Aggregation operators:** maximum, minimum, average, total, number of

*the average weekday delay of a train is aggregated from train delays,*

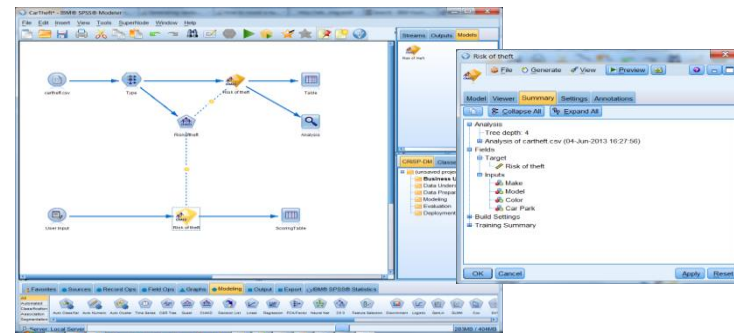
*where this train comes from the train of each train delay as the average delay of all train delays,*

*where the day of week of each train delay is not one of { Saturday, Sunday } maintained over a horizon of 1 year.*

# Predictive Agent

*Leverage SPSS predictive model in the decision*

- SPSS Model is created in SPSS Modeler
- A scoring server is exposed in SPSS Runtime Infrastructure



**New Predictive Scoring Agent Wizard**  
Connect to SPSS Collaboration and Deployment Services Server  
Create an Agent Project containing an SPSS Predictive Agent

Connection Details

URL:

User name:

Password:

☒ Save credentials?

```
public void prepareScoreRequest(ScoreContext scoreContext, ScoreRequest scoreRequest)
    throws AgentException {
    // Table name: User Input
    ScoreInputTable table1 = scoreRequest.addInputTable("User Input");
    ScoreInputRow table1row1 = table1.addRow();

    // TODO Enter location of value for "Make"
    table1row1.addInput("Make", "");

    // TODO Enter location of value for "Model"
    table1row1.addInput("Model", "");

    // TODO Enter location of value for "Color"
    table1row1.addInput("Color", "");

    // TODO Enter location of value for "Car Park"
    table1row1.addInput("Car Park", "");
}

@Override
public void processScoreResponse(ScoreContext scoreContext, ScoreResponse scoreResponse)
    throws AgentException {
    // TODO Map "R-Risk of theft" to entity if required
    String output1 = scoreResponse.getOutputValue("R-Risk of theft", 0);
}
```

**New Predictive Scoring Agent Wizard**  
Select Scoring Configuration  
Choose the scoring configuration that will be invoked by the SPSS Predictive Agent

Type filter text

- CarTheft
- CreditRating
- FlightPurchase
- CellSampleConfig
- FlightDeplane
- Bikes
- ParisBikes

**New Predictive Scoring Agent Wizard**  
Configure Scoring Endpoint  
Select or create a scoring endpoint, where this Agent should invoke the configuration

Scoring Endpoint

☒ Create new scoring endpoint  
☐ Use existing scoring endpoint

Name:

URL:

Description:

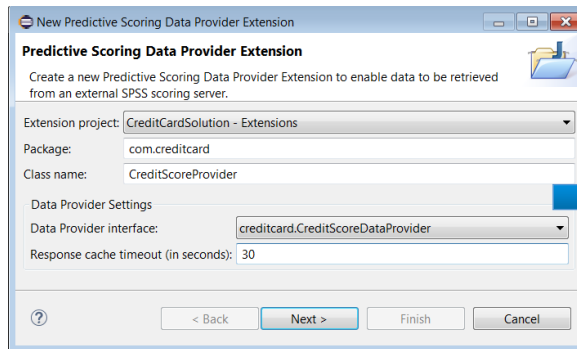
- Dedicated wizard to create an “SPSS Agent” linked to the scoring server
- The SPSS Agent invokes the scoring server and updates entity state with score value, given the context

# Insight Designer – Predictive Scoring Data Providers

- Bring together the benefits of two existing programming models to provide the simplest way to introduce scoring data into Insights solutions
  - API to simplify the scoring request code
  - Lazy execution
  - Configurable time caching of results

a customer is enriched by the Credit Score Data Provider ,  
given the customer from this customer ,  
setting the credit score of this customer to the credit score of this Credit Score Data Provider .

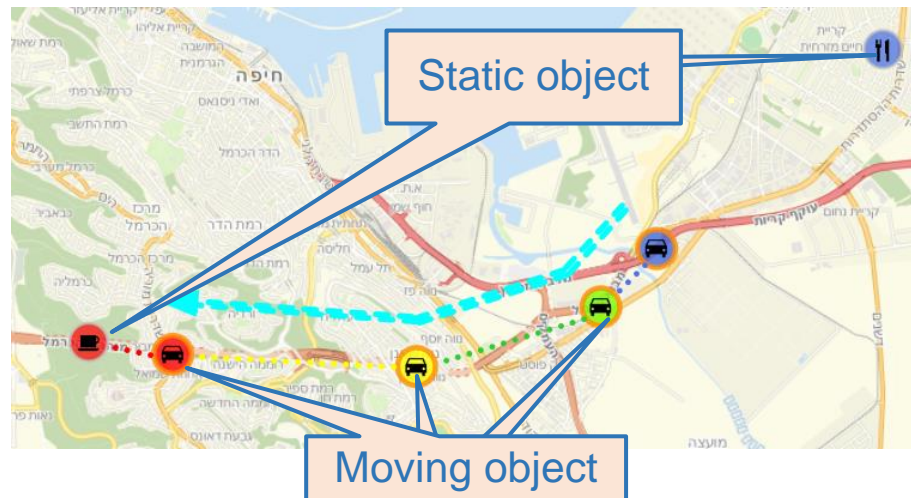
BMD statement



```
1 package com.creditcard;
2
3 import com.ibm.ia.common.ComponentException;
4
5
6 /* -----
7  * Scoring configuration
8  * -----
9  * You must define solution properties to configure the scoring
10  * endpoint named below.
11  *
12  * For example, if the scoring endpoint is CustomerScore.endpoint:
13  *
14  * <property name="CustomerScore.endpoint.url"></property>
15  * <property name="CustomerScore.endpoint.user"></property>
16  * <property name="CustomerScore.endpoint.password"></property>
17  *
18  */
19
20 @ScoringConfiguration(configurationId="CustomerScore",endpoint="CustomerScore.endpoint")
21 @DataProviderDescriptor(dataProvider = CreditScoreDataProvider.class, responseCacheTimeout=30)
22 public class CreditScoreProvider extends ScoringDataProvider<CreditScoreDataProviderRequest, CreditScore
23     public static final String CUSTOMERS = "Customers";
24     public static final String SCORE = "score";
25
26
27 @Override
28 public CreditScoreDataProviderResponse processRequest(CreditScoreDataProviderRequest request) throws
```

# Moving geometry attribute

- Geometry types
  - **Static**: location of an entity without movement, e.g., an office building, an airport ...
  - **Moving**: Location of an entity or an event, which **moves over time**, e.g., a person, a vehicle ...
- Moving geometry
  - Extends “a geometry” type
  - Operators over movement trail in rule language and Java API
    - Speed (average, min, max)
    - Observed location at timestamp
    - Approaching / leaving
    - ...

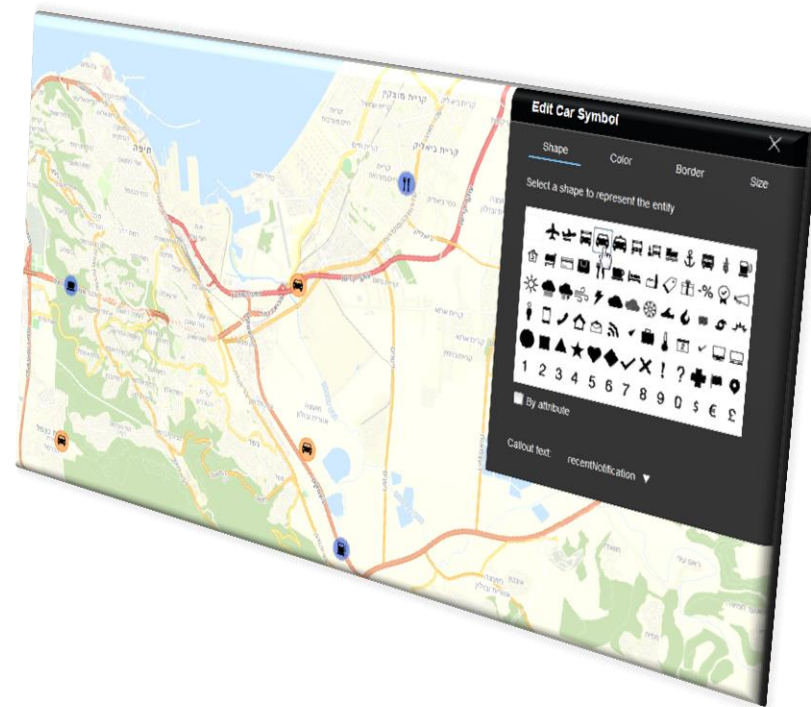


*a car is a business entity identified by a plate number with a model, a capacity (numeric), a color, a location (a moving geometry).*



# Map Viewer

- Working with geospatial objects without a map is difficult
- New Liberty feature: iaMaps
  - **Visualize spatial entities** on a map with geographic locations
  - Entities with geographic locations can be **automatically visualized** (discovered automatically through BOM introspection)
  - **Configurable and customizable** live map parameters: icon, color...



# Insight Designer — Insight solution testing

- **Artifacts to enable users to test solutions**
  - **Entity loaders** to define entities to load
  - **Event sequences** to define an ordered sequence of events
  - **Test scenarios** to coordinate entity loaders, event sequences and **write assertions** about the state of their entities
  - **Common definition files** to create definitions that can be used throughout the other testing artifacts
- **Languages for these assets are based around a subset of the rule language**
- **Can be run on a development server, by using Eclipse run configurations, without requiring the user to write any Java**

```
Load entities from "Customers" ;

check that the customer "Fred" exists ;

check that for the customer "Fred" :
- the customer id of this customer is "123"
- the name of this customer is "Fred"
- the status of this customer is BRONZE ;

submit events from "Fred transactions" ;

check that for the customer "Fred" :
- the status of this customer is SILVER ;

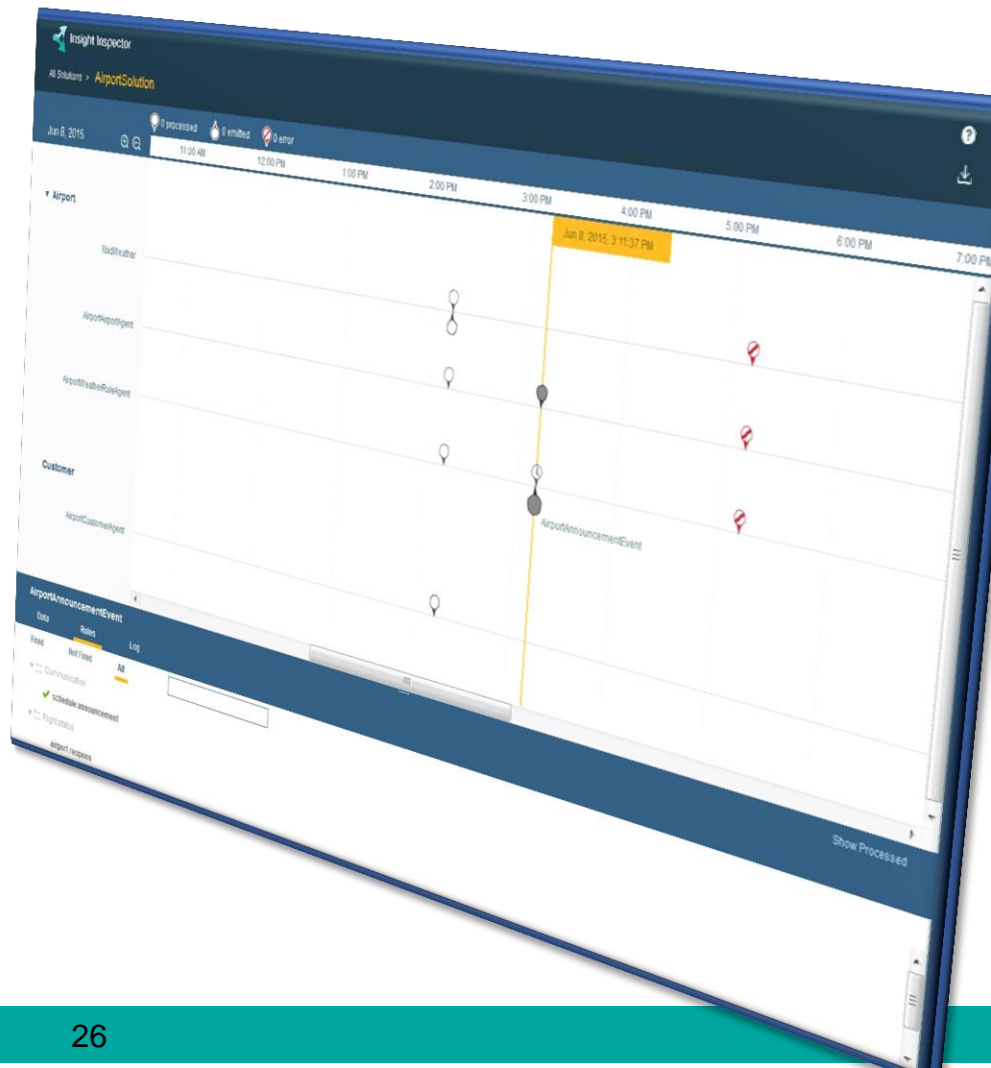
continue processing until 1/10/2016 ;

check that for the customer "Fred" :
- the status of this customer is BRONZE ;
```

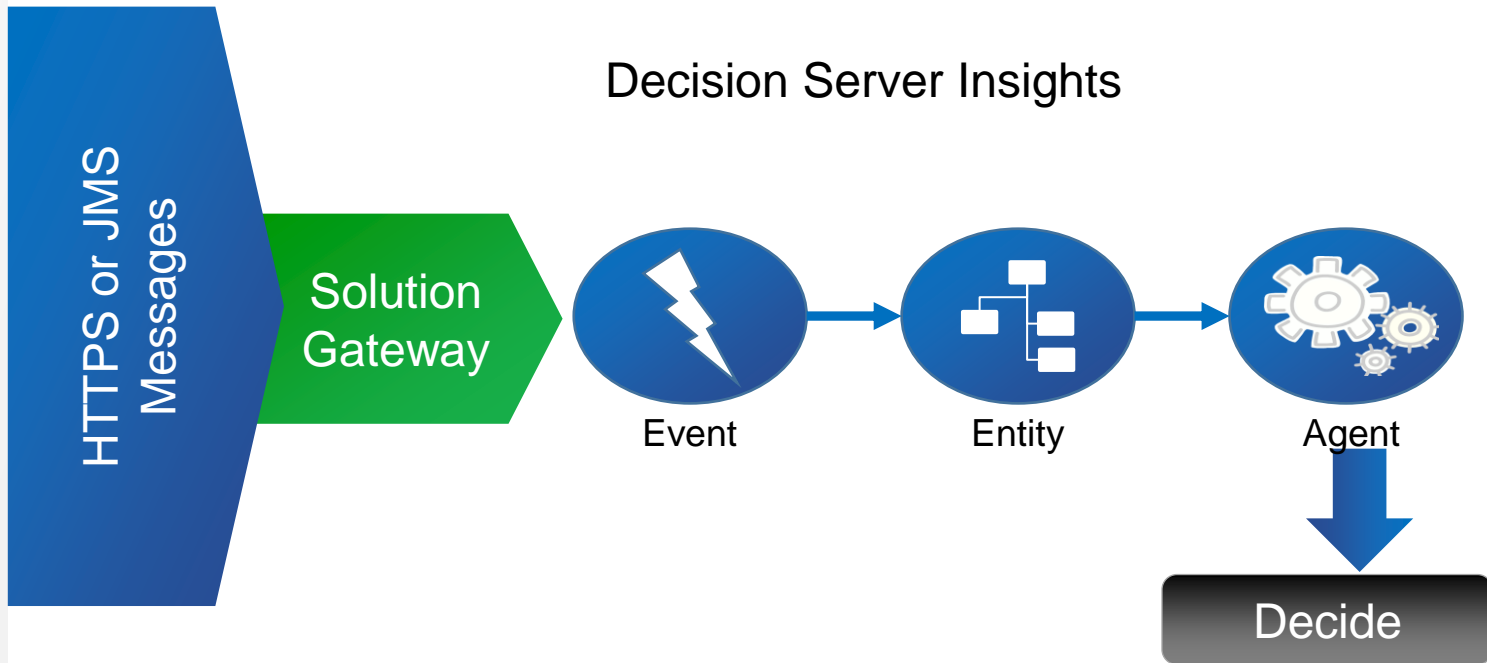
*Test scenario example*

# Insight Inspector

- Better organization of rules
- Better navigation between emitted (💣) and processed (🕒) events
- Display header timescale
- Display clock icons (🕒) to verify scheduled processing events

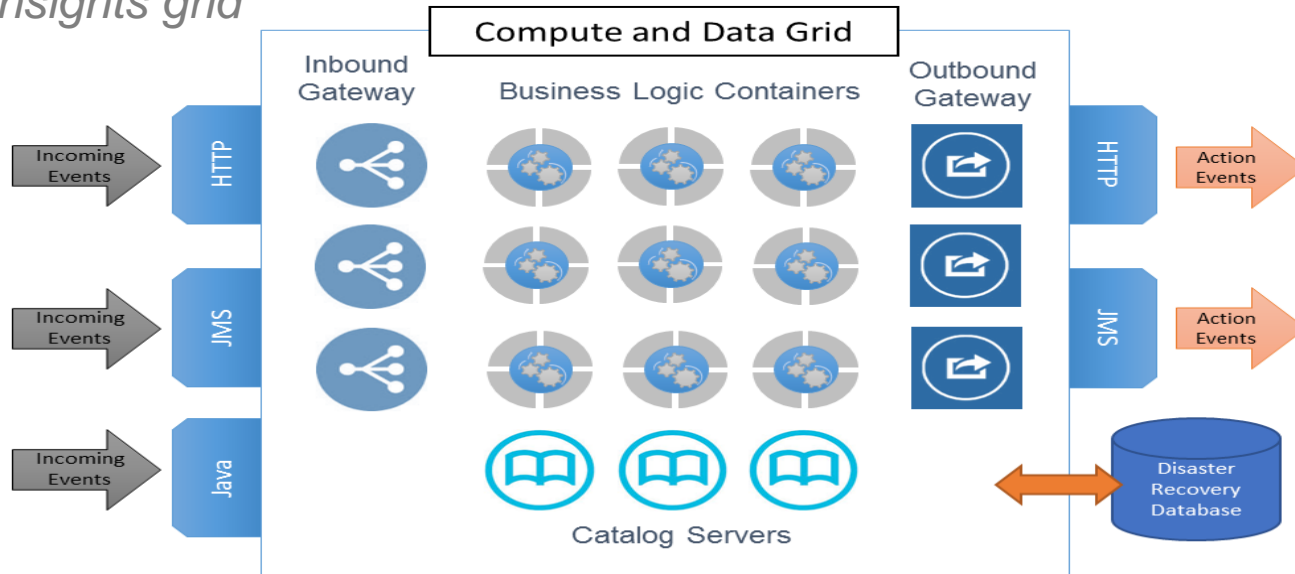


# Integrating Decision Server Insights



# Scale-out, High Performance Architecture

*IBM ODM Insights grid*

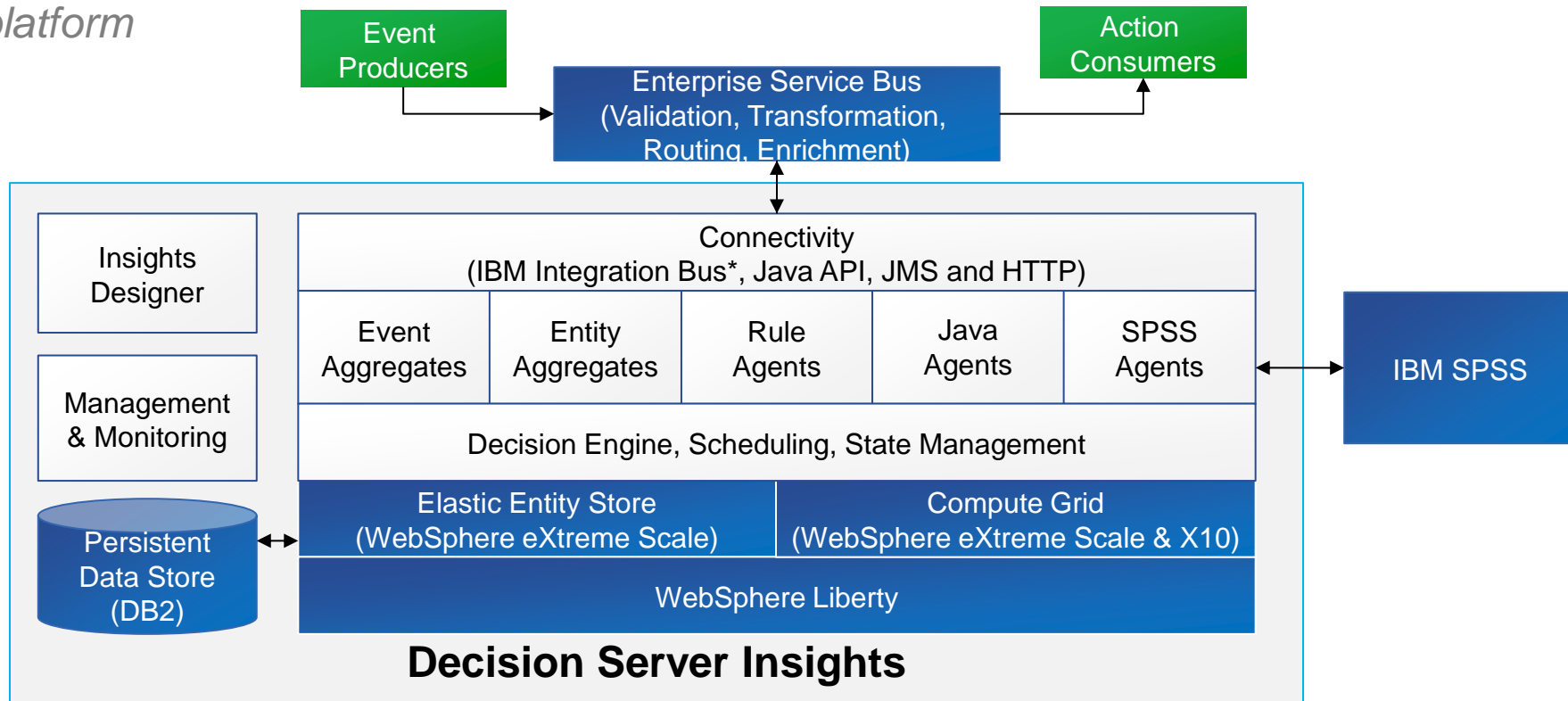


- Enable dynamic addition of connectivity and computing resources
- Collocates rule and analytics computing resources with context data

Analyzes millions of interactions over periods of **days, weeks or even months**

# High Level Architecture

*Integrating business rules, events, predictive analytics capabilities in a single platform*



\*IBM Integration Bus is included as a Supporting Program, which can only be used for development and test purposes.

# ODM Decision Server Insights – Key Benefits

Emerging Marketing, Fraud, customer care, compliance, operation management scenarios involves **complex, variable and dynamic decision-making**

ODM Decision Server Advanced Provide the flexibility and agility of **prescriptive Decision Management** in a situational context

Precision is critical for businesses to **differentiate**

Decision Server Advanced enable Customers to easily leverage **the power and adaptability of analytics** at the time of interaction

Self-serve mobile applications and the emergence of the Internet of things are **pushing the envelop**

Decision Server Advanced solutions **works at scale along all dimensions**

Organizations have **limited experience** and specialized skills are scarce

Decision Server Advanced offers a simple yet powerful model-driven approach that **limit complexity and risks**

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