Building the future of banking services

BIAN
Semantic API Webinar
21st November 2016
Hans Tesselaar (BIAN), Mike Downs (PNC), Guy Rackham/Jack Lowe (BIAN), Annap Derebail (IBM), Tim Ness (Discover)
### BIAN Semantic API Webinar – November 2016

#### Agenda

**On today’s call**

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<thead>
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<th>Topic</th>
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<td>Introduction to BIAN</td>
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<td>Wrap and Questions</td>
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</table>
Who is the Semantic API Working Group?

- Currently the largest working group in BIAN, peaking at 30 members, representing multiple banks, vendors, universities, and industry standard organizations.
  - PNC
  - IBM
  - Discover
  - Carnegie Mellon University (CMU)
  - CIBC
  - IFX
  - SAP
  - etc.
Guiding Principles - Mike Downs

An open approach

- BIAN has no interest in creating new API standards nor does it want to prescribe any particular technology.

- BIAN’s guidelines enable banks & suppliers to derive semantic APIs in a top down manner and to categorise API’s according to referenceable criteria....

- … and for different banks and suppliers to derive the same semantic API definition for the same service exchange.

- This approach to interoperability provides an architecture that will support any open API and any technical implementation (RESTful, SOAP etc.) provided that both parties agree on their use.
CMU Capstone Project - Scope

Last December CMU presented the findings of the latest Capstone initiative. They explored how the BIAN model could be used to define industry standard open APIs…

- **Problem**: Limited number of APIs support the integration of banking capabilities into the customer’s operations
  - To Provide a ubiquitous set of APIs that would access banking function in a common way.
  - To Produce a set of "technology agnostic APIs" that can be consumed by members of the BIAN community and external to it.

- **Scope**:
  - Technology agnostic API specification to agreed upon level
  - Classification of these APIs
  - Methodology guide to drive from business architecture to realizable application

- **Approach**
  - Analyze the findings of CMU around classification types surrounding the data and levels of precision
  - Define Service Operation Classification Framework
  - Map business scenarios to the framework/matrix
But to be useful APIs have to be established as a standard that can be widely adopted

- Current activity seems to target broadly established B2B and B2C message interactions
- The services also tend to be commodity/transactional in behavior where automation/streamlining activity is one if not the only key business driver
- Intended value from the APIs seems to be on the efficiency of implementing machine-level standard SW interfaces

Without an organizing framework to ensure the scope and purpose of the APIs can be defined in agreed/standard terms adoption will be fragmented. Furthermore with a ‘bottom-up’ focus on systems implementation a good question is whether other high value business interactions are being overlooked?
BIAN Designs have a number of interesting properties

The BIAN Service Domains and the service operation connections:

1. **Are Canonical** – any bank or solution provider can use the same elements
2. **Allowed/Default Connections** – analysis of the service connections provides design rigor
3. **Encapsulation** – the BIAN Service Domain is discrete and handles full-lifecycle support for its role
4. **Precision & Semantic APIs** – the framework allows for appropriate ‘precision’ for service exchanges
Business Activity is Captured as Exchanges between Service Domains

A ‘Business Scenario’ describes the sequence of exchanges that can be traced over a ‘wireframe of connected Service Domains…'
Business information/data scope of reference

In the end-to-end process view there is an implicit assumption that all/most data is shared and visible to everyone involved as necessary...

By defining a shared data model the assumption made is that all functions act on the same data set. In practice this is a significant constraint.
In the BIAN service model business information is encapsulated
Because the Service Domain encapsulates the control record information, service exchanges tend to involve much more ‘focused/specific’ information content…
In addition to having focused content, service exchanges can be semantic.

When the Service Domains do not share a common database determining the required ‘precision’ for the exchanged business information is key. Some exchanges only require some basic semantic alignment of terms...

The exchange has two key variables:

- Different terms that may refer to/identify the specific item of interest
- Different required precision/agreement to the definition of those terms
## Agenda

### On today’s call

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The Semantic API Guide defines a ‘top-down’ approach

Building from the Carnegie Mellon Capstone project the effort has been aligned the recent BIAN V5.0 release. The BIAN V5.0 Service Landscape is used to create a high-level design of a bank or of the interactions between banks and other market participants.

The Semantic API guidelines can then be used to implement the BIAN designs top-down. The BIAN Semantic API guidelines are set out in three main sections:

1. **Context** – explaining how the BIAN model provides a top-down perspective…

2. **Applicable Techniques & Standards** – providing a structure/framework for recording and selecting a wide range suitable approaches

3. **Deployment** – selecting techniques and standards that apply to common/standard types of exchange

A BIAN Service Operation defines the semantic exchange between two Service Domains. The guidelines are applied one connection at a time…
The Semantic API guidelines include a technique framework. The framework helps with the selection of different techniques and identified standards.
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Guideline Approach – Guy Rackham

Semantic API Implementation ‘topics’

More detailed topics are described. For each topic the way BIAN is applied and any identified general techniques/approaches and applicable industry standards are listed.

<table>
<thead>
<tr>
<th>Selection</th>
<th>Exchange Type</th>
<th>Information Type</th>
<th>Technical Environment</th>
<th>Service Assurance</th>
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</thead>
<tbody>
<tr>
<td><strong>Semantic Exchange</strong></td>
<td>Conversation (any media)</td>
<td>Interactive data extract</td>
<td>Mainframe (P2P)</td>
<td>User Interface</td>
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<tr>
<td><strong>Semantic Interpretation</strong></td>
<td>Interactive data capture form</td>
<td>Information form</td>
<td>Svs Enabled (C/S, ESB)</td>
<td>Data exchange interface</td>
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<td><strong>Data Presentation</strong></td>
<td>Interactive data presentation</td>
<td>Data record</td>
<td>Distributed (Cloud)</td>
<td>Service directory</td>
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<tr>
<td><strong>Data Exchange</strong></td>
<td>Data publishing</td>
<td>Narrative log (any media)</td>
<td>Public Networking</td>
<td>Service exchange</td>
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<tr>
<th><strong>Analytics</strong></th>
<th>Analysis</th>
<th>Security assurance</th>
<th>Inter-Enterprise</th>
<th>Security assurance</th>
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<tbody>
<tr>
<td><strong>Enhanced Security</strong></td>
<td>Encapsulation</td>
<td>Enhanced CIA</td>
<td>Base level CIA</td>
<td>Base level CIA</td>
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<td><strong>Subscriber Assurance</strong></td>
<td>Authentic/authorized</td>
<td>Enhanced audiability</td>
<td>Base level auditability</td>
<td>Enhanced auditability</td>
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<tr>
<td><strong>Inter-Enterprise</strong></td>
<td>Appropriate</td>
<td>Aligned/qualified/coordinated</td>
<td>Enhanced CIA</td>
<td>Aligned/qualified/coordinated</td>
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</table>
## Topics Standards Reference Matrix

Brief descriptions of the techniques and any identified available standards are listed below:

<table>
<thead>
<tr>
<th>TOPIC</th>
<th>OUTLINE TECHNIQUE/APPROACH</th>
<th>BIAN USE</th>
<th>APPLICABLE STANDARDS</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Exchange Type</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conversation (any media)</td>
<td>Confirm subject matter, key terms and objectives/goals of the exchange</td>
<td>Semantic exchange</td>
<td>Industry terms &amp; definitions</td>
</tr>
<tr>
<td>Interactive data extract</td>
<td>Interactive exchange where data is extracted for processing purposes</td>
<td>Semantic vocabulary</td>
<td>HCI menu/verification standards</td>
</tr>
<tr>
<td>Data capture form</td>
<td>Machine readable data entry</td>
<td>NA</td>
<td>Data capture standards</td>
</tr>
<tr>
<td>Interactive data presentation</td>
<td>Interactive exchange where machine data is presented for semantic interpretation</td>
<td>NA</td>
<td>Data representation/context generation</td>
</tr>
<tr>
<td>Data publishing</td>
<td>Machine generated output that can be read/interpreted</td>
<td>Semantic context</td>
<td>Messaging standards</td>
</tr>
<tr>
<td>Transaction exchange</td>
<td>Formated data record exchange</td>
<td>Semantic exchange</td>
<td>File transfer standards &amp; protocols</td>
</tr>
<tr>
<td>File transfer</td>
<td>Batch data transfer</td>
<td>Semantic exchange</td>
<td></td>
</tr>
<tr>
<td><strong>Information Type</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Information items</td>
<td>Single items of business information</td>
<td>Semantic vocabulary</td>
<td>Ontologies &amp; Vocabularies</td>
</tr>
<tr>
<td>Data elements</td>
<td>Machine representation of single items of data/information</td>
<td>Semantic examples</td>
<td>Data dictionaries</td>
</tr>
<tr>
<td>Information form</td>
<td>Structured collection of information items (optional and mandatory)</td>
<td>Semantic description</td>
<td>Industry templates/form layouts</td>
</tr>
<tr>
<td>Data record</td>
<td>Structured collection of single items of data (optional and mandatory)</td>
<td>Semantic description</td>
<td>Data transaction record standards</td>
</tr>
<tr>
<td>Narrative log (any media)</td>
<td>A log of an exchange supporting interpretation and analysis</td>
<td>Semantic context/content</td>
<td>User interaction behavioral analysis/mining</td>
</tr>
<tr>
<td>Recording (any media)</td>
<td>A presentation/recording of unstructured information using any mechanism/media</td>
<td>Semantic context/content</td>
<td>Recording/publishing standards (any media)</td>
</tr>
<tr>
<td>Analysis</td>
<td>A presentation of analysis using any suitable format, mechanism/media</td>
<td>Analysis description</td>
<td>Analysis views and algorithm standards</td>
</tr>
<tr>
<td><strong>Deployment Environment</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>User Interface</td>
<td>Information/data presentation and capture screen design</td>
<td>Semantic context/content</td>
<td>Screen display standards</td>
</tr>
<tr>
<td>Data exchange interface</td>
<td>Message/data exchange interface</td>
<td>Semantic exchange</td>
<td>Data/message standards</td>
</tr>
<tr>
<td>Session management</td>
<td>Session access control</td>
<td>Role/responsibility context</td>
<td>Session access/control standards</td>
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<tr>
<td>Service directory</td>
<td>Service discovery and classification mechanisms</td>
<td>BIAN – Service Landscape</td>
<td>Service &amp; message standards</td>
</tr>
<tr>
<td>Service exchange</td>
<td>Service operation to message mapping techniques</td>
<td>BIAN – Service Operations</td>
<td>Industry service and message standards</td>
</tr>
<tr>
<td>Encapsulation</td>
<td>Optimised function and information partitioning and service enablement</td>
<td>BIAN – Service Domain</td>
<td></td>
</tr>
<tr>
<td>Security assurance</td>
<td>Access control mechanisms</td>
<td>Role/responsibility context</td>
<td>RACF SSC etc</td>
</tr>
<tr>
<td><strong>Service Assurance</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Base level CIA</td>
<td>Confidentiality, Accuracy, Authenticity, Completeness, Performance, Resilience</td>
<td>Semantic exchange</td>
<td>Information security standards</td>
</tr>
<tr>
<td>Base level auditability</td>
<td>Labeling, audit &amp; analysis techniques</td>
<td>Semantic context</td>
<td>Audit standards</td>
</tr>
<tr>
<td>Enhanced CIA</td>
<td>Enhanced CIA</td>
<td>Semantic exchange</td>
<td>Specialist security standards</td>
</tr>
<tr>
<td>Enhanced auditability</td>
<td>Enhanced auditability</td>
<td>Semantic context</td>
<td>Enhanced audit standards</td>
</tr>
<tr>
<td>Authentic/Authorized</td>
<td>Service subscriber management (Authentic/Authorized)</td>
<td>Role/responsibility context</td>
<td>Service access standards</td>
</tr>
<tr>
<td>Appropriate</td>
<td>Appropriate usage assurance</td>
<td>Service Domain Context</td>
<td>SLA – Service Definition</td>
</tr>
<tr>
<td>Aligned/qualified/coordinated</td>
<td>Enterprise alignment – strategy, policy, controls</td>
<td>M4Bank framework</td>
<td>SLA Enterprise Agreement Standards</td>
</tr>
</tbody>
</table>
The Semantic API Initiative Leverage an IBM PoC Cloud Implementation

The IBM PoC supported a complex usage scenario. The business activities were modeled using BIAN Service Domains and interfaces aligned to service operation exchanges. A selection of these exchanges was made to explore how the guidelines would apply…

- A bank is affiliated with a travel agency, offering targeted holiday packages
- A sales campaign identifies and targets holiday offers to bank customers
- A bank customer browses and selects a holiday package
- When on holiday the customer uses their bank card to make many purchases. The bank uses a third party card processing firm
- The travel agency is provided with card usage details for their own analysis
- In return for providing survey information the travel agency funds reward points for the customer
1. Customer campaign execution – Contact Dialogue > Campaign Execution
2. Customer browses travel products – Contact Dialogue > Product Directory
3. Customer buys travel package – Contact Dialogue > Current Account
4. Card member uses their card on holiday – Financial Capture > Card Fulfillment
5. Location authentication (customer activates prior to travel) – ATM Operations > Inventory Tracking
6. Travel agent gets card usage analysis – Business Development > Card Fulfillment
7. Travel agent approves award points – Merchant Relations > Rewards Account
## The Standard Interface Types

Provide a range of different interactions, each using different topics of the guidelines...

<table>
<thead>
<tr>
<th>Interface</th>
<th>Description</th>
<th>Calling Service Domain</th>
<th>Offering Service Domain &amp; service operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - Automated Customer Transaction (non-financial)</td>
<td>Customer is presented with a cross-sell campaign offer (vacation offers) when logged into the bank website. Customer indicates an interest in selecting a vacation package…</td>
<td>Contact Dialogue</td>
<td>Customer Campaign Execution - Execute Customer Campaign</td>
</tr>
<tr>
<td>2 - Automated Customer Interactive Dialogue</td>
<td>Customer accesses the travel agent's product directory using the campaign identifier and browses travel packages. Selects one to purchase…</td>
<td>Contact Dialogue</td>
<td>Product Directory (Travel Agent) - Retrieve Product Directory</td>
</tr>
<tr>
<td>3 - Customer Initiated Transaction (financial)</td>
<td>Customer buys the travel package, paying from their current account to an internal account for the travel agent… (Note the booking confirmation is not covered here)</td>
<td>Contact Dialogue</td>
<td>Current Account - Execute Current Account (Payment – inter account)</td>
</tr>
<tr>
<td>4 - Automated Customer Transaction (financial)</td>
<td>Customer uses their credit card to make purchases when on holiday</td>
<td>Financial Capture</td>
<td>Credit/Debit Card Fulfillment - Execute Card Transaction</td>
</tr>
<tr>
<td>5 – Interactive Read</td>
<td>ATM Operations checks that a customer card has been approved for use in a foreign country</td>
<td>ATM Operations</td>
<td>Inventory Tracking - Retrieve Card Status (check country usage)</td>
</tr>
<tr>
<td>6 - Reporting Request (Pre-formatted – asynchronous))</td>
<td>Travel Agent obtains card usage reports for analysis. (Note, pre arranged access and security aspects not covered here)</td>
<td>Business Development</td>
<td>Credit/Debit Card Fulfillment - Retrieve Card Usage Analysis</td>
</tr>
<tr>
<td>7 – Batch Financial Transaction</td>
<td>Travel Agent requests allocation of rewards points to bank customers. obtains card usage reports for analysis. (Note, pre arranged access and security aspects not covered here)</td>
<td>Merchant Relations</td>
<td>Reward Points Awards and Redemptions - Execute batch awards</td>
</tr>
</tbody>
</table>
### Standard Interface Types

#### Initial topic mappings:

<table>
<thead>
<tr>
<th>Standard Interface Type</th>
<th>1 - Automated Customer Transaction (non-financial)</th>
<th>2 - Automated Customer Interactive Dialogue</th>
<th>3 - Customer Initiated Transaction (financial)</th>
<th>4 - Automated Customer Transaction (financial)</th>
<th>5 - Interactive Read</th>
<th>6 - Reporting Request (Pre-formatted – asynchronous)</th>
<th>7 - Batch Financial Transaction</th>
</tr>
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<tbody>
<tr>
<td><strong>Exchange Type</strong></td>
<td>Conversation (any media)</td>
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<td>Recording (any media)</td>
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<td><strong>Deployment Environment</strong></td>
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The same interface may be implemented using different approaches

An interface defined using the BIAN Service Domains may have different implementations in practice. It is necessary to confirm which standard interface type applies:

For example consider the second interface in the case study where the bank customer browses the travel agent’s offerings to select a holiday. In one implementation the servicing rep in the contact center may simply describe the holiday offers. In another the agent may be able to publish their brochure as a window within the bank’s website application…
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- Wrap and Questions
  - All
Natalie is thinking about going on vacation for the coming winter, as a family tradition. One day, Natalie receives a notification from her bank about special vacation packages with discounts. Natalie follows the link to a travel app to research destinations and packages that match her needs and preferences. Natalie purchases a package with 15% discount using the bank’s payment API. She browses several related offers and services. Upon arriving at the destination, Natalie searches for ATMs using the travel app. Upon ATM use, Natalie is notified by her bank about activation of credit card and related benefits and banking services. Natalie and family have a great time. After coming back home, Natalie is asked to provide a review of the package and activities with a chance to earn extra points.

Bank APIs/Services
- Campaign to initiate proactive offer of vacation packages
- Location based services (ATM/branch and credit card)
- Credit card transactions during vacation
- Reward points for credit card
- Community

Travel Services
- Vacation packages using Watson’s Retrieve & Rank
- Search for things to do and restaurants
- Package and activity reviews
- Event notification to bank

Case Study Scope – Vacation Co-Marketing/Sales; Destination Support; Loyalty Networks
Top Down Approach

- Define use case and user story from channel user perspective
- Create screen flows and define minimum viable product
- Map screen flow interactions into BIAN business scenarios
- Identify BIAN service domains and business APIs
- Use IFW banking resource models to create implementation APIs
- Define integration points to core systems

Developed using IFW REST API tooling

- Rapid API identification and composition
- Consistency across the enterprise
- Modular architecture
Case Study – Annap Derebail

Standard Interface Type

3 - Customer Initiated Transaction (financial)

- Conversation (any media)
- Interactive data extract
- Data capture form
- Interactive data presentation
- Data publishing
- Transaction exchange
- File transfer

- Information items
- Data elements
- Information form
- Data record
- Narrative log (any media)
- Recording (any media)
- Analysis

- User interface
- Data exchange interface
- Session management
- Service directory
- Service exchange
- Encapsulation
- Security assurance

- Base level CIA
- Base level auditability
- Enhanced CIA
- Enhanced auditability
- Authentic/authorized
- Appropriate
- Aligned/qualified/coordinated
Implementation A
- Provide specific customer characteristics (structured data)
- Lookup pre-screened offers based on customer characteristics
- Provide list of matching offers (structured data)

Implementation B
- Structure a free-form dialog that is voice driven or text query driven
- Use AI to understand customer needs and preferences to matching packages
- Provide list of matching packages
Model Driven Approach to Banking APIs

**Open Banking APIs**
- Banking APIs
- Supporting Services

**Model Driven Development**
- BIAN Business Services
- IFW Tooling for REST API
- API Connect Tooling
- DevOps Repository

**API Platform**
- Developer Portal
- Scalable Runtime
- Security & Control
- Deploy

**Channel Apps**

**3rd Party Apps**

**Legacy Systems**

- Customized Integration

**API Platform for APIs (Cloud or On Premise)**

**IFW Tooling**
- BPEL/WSDL/Java

**Enterprise SOA**
- Business Process
- Business Rules
- Integration with ESB

**Enterprise Security & Control**
BIAN Semantic API Webinar – November 2016

Agenda

On today’s call

- Introduction to BIAN
  - Hans Tesselaar (BIAN Chief Executive)
- Project Overview
  - Mike Downs (PNC)
- Guideline Approach
  - Guy Rackham (BIAN)
- Case Study
  - Annap Derebail (IBM)
- Plans for Discover
  - Tim Ness (Discover)
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QUESTIONS

All...

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APPENDIX