SERVICE COMPUTING EIS, WORLD PANIC AND OUR ROLE CHANGE

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Abstract: Service computing and SOA allows EIS experts to have smarter way of systems realization and continuous evolutions based on underlining business objectives. It is true that they almost solved major technical issues lying for many decades. However huge problems like world economic crisis came up due to the EIS making the loan business model happen. This paper discusses how Information Technology is related to the causes of this crisis and how we should be and what to do.

1 INTRODUCTION

Problems of Enterprise Information Systems (EIS) have been tackled with for a long time. But there remains unsolved like difficulties in EIS Lifecycle, taking a long time and many efforts to deliver and poor ROI, until Service Computing come up.

SOA and service components availability are improving most of this problems in great extent. A short demonstration shows how easily EIS could be quickly realized by SOA.

Is it true that most of the technical problems have been solved and no need of worrying about them? The remaining problems are availability of service that is invoked by Business Process and compensation process.

New problem came up. As it is possible to make any business models happen in a short time and less effort and cost, it is easy to start up any business and exploit it quickly and widely. Sub prime loan model for real estate is just an example of this. IT professional has to be ethical.

However SOA does not bring in the bright and prosperous era for the EIS but the end of the traditional EIS professional mind and ethics. This talk will discuss basically four-folded topics, namely, the true SOA impact and potentialities which author recognized through SOA projects, the SOA technical drawbacks and possibilities of the overcoming, IT relevancy to this crisis causes and some suggestions to EIS professional future.

2 BUSINESS AUTOMATION

IT has kept helping promote business automation. Recent technologies are web 2.0, service computing, SOA, cloud computing.

2.1 Web 2.0 and Service Computing

The terminology Web 2.0 seems a "bus word" which has no formal definition telling its semantics exactly, but says something different from the previous Web. Web2.0 implies that platform is neither longer Operating Systems nor virtual machine, but internet itself.

2.2 SOA (Service-Oriented Architecture)

Service computing from IEEE means more wide sense of modern computing concept than web. Table 1 shows a summary of IEEE and IBM definitions of service computing (SVC).

Table 1: SVC Definition.

	IEEE (IEEE, 2008; url)	IBM (IBM, 2008; url)
Research Area	Across discipline Science for bridging gap of business services and IT service	Same to IEEE but amend a phrase" for support business Services"
Technologies	Web services and SOA, and relevancies like business process modeling, transformation, integration.	SOA and Web services, for examples, Business Explorer for Web Services, Web service outsource manager
Key point	Life cycle for service innovation	SOA and Web services and Business process integration and performance management.

Table 2 shows SVC is a scientific framework while SOA is a technological concept and facility.

Table 2: SVC and SOA.

	SVC	SOA
Summary	A science for fulfilling the gap include service modeling and deploy, SOA, SLA, nonfunctional,	Service oriented Architecture for software
Research Agenda	All problems of service innovation	Service component development and its reuse in software

Many methods and paradigms like Business Engineering, Object-oriented, Aspect Programming and XP, have been used in making business idea realistic and making relevant business practices be implemented as EIS. Difference between traditional and SOA approach is whether or not EIS can be directly executed based on BPMN in stead of long journey of hierarchical decomposition of requirements. EIS complies through dynamic connecting of service components.

Among others, SOA, coined as Service-oriented Architecture by Gartner Group (Ceralry et al., 2005), is thought a promising method which is suitable for put any EIS into practical work smoothly and quickly. SOA allows EIS professionals to find out optimum business process for underlining business goals collaborating with business people and immediately put the process into practical work on computing environments. Therefore SOA promises a lot of advantages to EIS communities including optimized ROI of IT, improving of value quality, productivity, time duration, cost and other factors to deliver EIS and keep evolving it (Iskandar et al., 2008).BPEL, WSDL XML Schema, are transformed from BPMN and needed for execution, See Appendix Fig. through Fig.

2.3 Mash Up

Mash up allows anyone to combine services available on Web sites and utilize the combined services as if they were single site service. As service interface, Web API (Application Programming Interface) is used. Mash up advantages include less endeavor for developing EIS and much faster delivery than make all of them by themselves. This is a reason why mash up is called a lightweight integration on the web. Its disadvantages include business relying on needed services from public sources so that there is a possibility of encountering any unexpected force quit of those published service availability you need (Matsumoto et al., 2009).

2.4 Cloud Computing

Basically cloud computing have two senses: platform or certain specific type of application. As the platform sense, cloud computing provides such functionalities as server provisioning/de-provisioning, configuration/reconfiguration dynamically on demand basis. Cloud server could be either physical or virtual machine. Cloud is equipped with Storage Area Network, network devices, firewall and other security devices.

As the application sense, cloud computing means such application that able to be accessed through internet. This application utilizes powerful server and large scale DB center which hosting Web application and Web server.
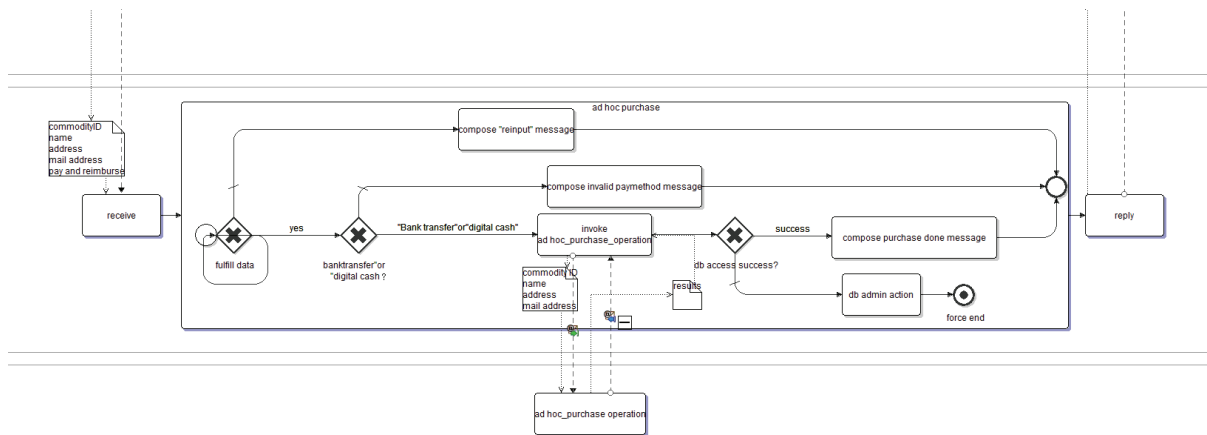
Figure 1: Business Process Modeling Example.

One remarkable point on the EIS-related technologies mentioned above is that it must be more difficult to identify any computer criminals. One reason is that there is no need to keep holding all the EIS documents except BPMN (BPMI.org, 2004) and SLA of reusing services. If you have to find out any evidence of possible criminal, you have to trace and analyze logged data of EIS dynamic executions through out web environments.

3 RECENT EIS AND WORLD PANIC

For recent years, a lot of experiments have been made in using SOA and other web service-oriented approach for EIS development. Some are success and some are not. Success stories tell us that SOA made a faster development of EIS possible (Iskandar et al., 2008). The success is brought up by changing way of development from *making-systems* to *just use* published services on the web. The author of this paper does not intend to describe details of the success experiments the author experienced but does intend to focus on why this time tragedy comes up as a real utilization of the EIS technology described in the section 2.

3.1 The World Panic

The case is subprime loan EIS for real estate housing and automobile. Figure 1 shows possible causes which cause the tragedy.
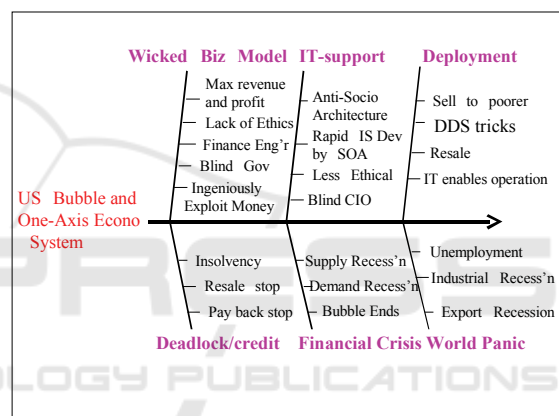

Figure 2: The World Panic Causes in Fishbone Diagram.

It is obvious that this loan business model has never been operated without the associated EIS be implemented and run. Fig 2 exhibits three causes in the upper low and three consequences in the lower. News media told us that this time recessions came up originated from US bubble economy end. How the bubble comes appear?

3.2 Consideration

Based on aggressive business modeling, more new brand of financial system comes up and loan became available in real estate and automobile consumers. IT support made this business happen and be exploiting the business extensively and smoothly. Without IT support, EIS for the business model, nothing could be made possible. Modern EIS technology made the business as much quickly possible

to run. The web service deployment adopts any business change requirements and meets them.

3.2.1 Root Cause

IT is an enabler which enables business model is implemented and makes it happen. Business modeling team include CEO CIO Financial engineer, business architect never exploit their business without having EIS support. Therefore EIS support could be a part of the root cause. Background may be a bubble nature in US economy, specifically loan promotion to every consumer even the less wealthy.

World panic root cause is one thing and US crisis root cause is another. Be very careful to distinct them, since causes and effects are related as a chain and effect turns to cause to another. You must catch the real root cause. World panic root cause could be US bubble nature and its end and world's rely on dollar. However what is the root cause of US financial crisis? It must be in the business system inventors' actions and/or the loan and commercial paper traders'.

3.2.2 IT Professionals Innocent

IT professionals involved must know how the loan system works, especially DDS (Digital Default System) frail and danger. They must easily foresee what will happen in the future buy or sell market and US economy system if someone who has debt becomes impossible to clear up one's liabilities.

IT professionals must be guilty no matter how they were aware of the consequences of the IT system.

There is strong opinion saying such situation like subprime loan is not our business and should not care about it. Moreover every professionals should have a freedom in pursuing their business and should not be constrained by any regulation

Author thinks that such utilization of EIS technology for anti-socio purpose seems unhappy to world people even if such act should not be deserved any law violation.

Even if any regulation is needed, but no effective way exists for preventing anyone to make it happen. Later chapter will discuss about this effective way.

4 ISSUES

4.1 Technical Issues

Irregular Process. Irregular cases are inevitable to occur in business process. Any model should not be thought valid unless pay enough attention to possible irregular cases. Though there is a definition of compensation upon any event that irregular cases happen, but the BPMN specification is still not enough (BPMI.org, 2004). Basically irregularity has two requirements to be met, let's say, causes of the irregularity which causes the irregular case and action process which has to be executed upon the event occur. (BPMI.org, 2004) provided only a simple language construct which specifies that compensation is took place in a process and nothing more than that.

Irregular case is usually huge and almost infinite in its number. However business process modeler has to specify negligible events and the associated action process exactly in appropriate place in process model.

Lack of Standards. SOA advantages are featured by standardization of BPMN language and Web service languages for developing, deploying, and invoking. The standards are not yet good enough. The BPMN has no feature of calendar basis job run and interfaces with work flow execution.

For message description, XML and its schema, SOAP protocol are available. However no self-contained language is yet available for describing both web service specification itself and the interface though WSDL covers the interface description.

4.2 Service Penetration

Analogy to internet extern ability, SOA will be exploited as much as published services will be available. But IT industry does not seem vital to exploit good web services,

The one secret why Toyota Production System TPS is excellent, they have good parts industry around and enjoy just in time parts delivery. Without having good parts industry, no TPS could exist. EIS systems business has the similar nature to this instead of hardware parts but software.

Software parts industry could not have got remarkable success as far as author knows throughout

software reuse history. One outstanding point in SOA is that provided is supporting environment where service components could be developed. ESB and business process engine helps service are deployed in any business process model. Some standards like WSDL, SOAP, and XML Schema would promote services reuse and exploit.

4.3 Compliance

Compliance is normally put into practiced at every stage in organizational activities. But compliance are mainly for defending them from possible impeachment, let's say, prepares every needed exhibit documentations of business activities, for example accounting related transactions, as seeing in SOX act[1]. Compliance does not work effectively for preventing such tragedy from occur again and over again. With Web service-oriented EIS methods, it become more faster to deliver the EIS and more dynamic of systems execution changing selective reusing of services.

5 TOWARDS BRIGHT EIS

We overviewed some EIS development and change methods. SVC and SOA may be a leading edge technology which solves major problems in EIS. The technology will become as much powerful as the technical issues could be improved.

What we should not miss is that the technology should be rightfully used and should not for anti human socio purpose. It may be difficult to foresee, find and prevent any criminal action using EIS prepared Of course the results of the action will be revealed and known to people, but it is many months AFTER the crime committed.

SOA or any other EIS technologies may not always bring a bright and prosperous EIS era. The world relies on EIS professional and business people's mind, intention and ethics.

We should stop or no expect anyone realize and put EIS into practice for anti humanistic and socio purpose. However it is obvious that there is no effective way to prevent wrong use of the technologies. Even no one of us wants the technologies used only

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[1] Public Company Accounting Reform and Investor Protection Act of 2002, Sarbanes and Oxley

for right purpose and not evil, but it is nothing but hope. Today's world, not everyone but someone, is enjoying the ever coming up victory of EIS technologies, but we are standing on dangerous field where possible explosive.

Is there any good idea for things going in a right way? One disciplines called Three Parties Law from old Ohmi Shoho Japanese Economics, but precious in this century, telling us that "One or Two Parties Satisfaction is silver and may be survive, this two plus Community become gold and live for a long". This tells us that good strategy is not in win-win relationship but three folded win.

6 CONCLUSIONS

The Subprime Loan Financial Systems let us be aware that EIS professionals should not act as a servant to their clients but should be as a business value creator who brings truly good things to the world. Domain (Financial Engineering in this case) experts and many others have been involved, but it is obvious that without EIS, any business has never been come realistic and actually run.

EIS by its technology is in turning point from follower position to leader stance in business innovation team in a sense of enabling business process model actually enact and make validity judgments of the business run. This means EIS professionals is no longer a technical supporter but become to take more responsible role in modeling business competence that is essential gist of corporation. Compliance and internal control system works may be good enough in a sense of accounting but absolutely not in ethical responsibility of the business model enact.

Consequently EIS professionals have to take major part of responsibility of the business where the EIS is effective in the world. One way to keep track the technologies use in a right objectives is to have EIS experts as a business leader or at least core members of business leaders' team who is holding a great responsibilities of business innovation. There are many reasonable reasons for this choice. EIS experts viewpoint and stance must be ideal for pursue more optimum solutions to total EIS than anyone who has each divisional responsibility. Stakeholders must agree with that a leader must be

choosing out from parsons who has top capabilities on the realization of core competence.

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BRIEF BIOGRAPHY

Masao J. Matsumoto received the B.S. degree in Mathematics from Waseda University, and the Ph.D. degree in Computer Sciences from the University of Kyushu, Japan. He is currently a Professor at the Faculty of Computer Sciences, Kyushu Sangyo University. His main research interest is in e-business and solution engineering. He received the Deming Award in 1995 for his work on Software Quality Management. He has been a professor at Informatics, Dortmund University, Germany. He has served on the IEICE research thrust to pursue the Global Competence and Enterprise Modeling in Internet Era. He has served on the program committees of several conferences, including ICEIS, IEEE Software Reuse, and IEICE SWIM. He has received Grand Championship of Social Dance Kanagawa Tournament 2007.

APPENDIX

```
<?xml version="1.0" encoding="UTF-8"?>
<bpel:process
xmlns:bpel="http://docs.oasis-open.org/wsbpel/2.0/process/executable"
xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:vprop="http://docs.oasis-open.org/wsbpel/2.0/varprop"
xmlns:pnlk="http://docs.oasis-open.org/wsbpel/2.0/plnktype"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns:ns="http://Sales_Service/xsd"
xmlns:this="http://example.com/NewDiagram/Flow_5"
xmlns:Services="http://example.com/NewDiagram/Services"
xmlns:axis2="http://Sales_Service/"
xmlns:diag="http://example.com/NewDiagram"
xmlns:tns="http://www.example.org/messages"
xmlns:Client="http://example.com/NewDiagram/Client"
xmlns:xml="http://www.w3.org/XML/1998/namespace"
xmlns:bpmn="http://www.intalio.com/bpms"
xmlns:atomic="http://ode.apache.org/atomicScope" queryLan-
guage="urn:oasis:names:tc:wsbpel:2.0:sublang:xpath2.0" expressionLan-
guage="urn:oasis:names:tc:wsbpel:2.0:sublang:xpath2.0"
bpmn:label="Flow_5" bpmn:id="_Qx4hYLezEd2SefdpxuIA7w"
name="Flow_5" targetNames-
pace="http://example.com/NewDiagram/Flow_5">
  <bpel:import namespace="http://Sales_Service/" loca-
tion="Sales_Service.wsdl" import-
Type="http://schemas.xmlsoap.org/wsdl/"/>
  <bpel:import namespace="http://example.com/NewDiagram" loca-
tion="NewDiagram.wsdl" import-
Type="http://schemas.xmlsoap.org/wsdl/"/>
  <bpel:import namespace="http://example.com/NewDiagram/Flow_5"
location="NewDiagram-Flow_5.wsdl" import-
Type="http://schemas.xmlsoap.org/wsdl/"/>
  <bpel:partnerLinks>
    <bpel:partnerLink name="clientAndFlow_5PlkVar" partnerLink-
Type="diag:ClientAndFlow_5" myRole="Flow_5_for_Client"/>
    <bpel:partnerLink
name="servicesAndFlow_5ForSales_ServiceSOAP11port_httpPlkVar"
partnerLink-
Type="diag:ServicesAndFlow_5ForSales_ServiceSOAP11port_httpPlk"
initializePartnerRole="true" partnerRole="Services_for_Flow_5"/>
  </bpel:partnerLinks>
  <bpel:variables>
    <bpel:variable name="thisReceiveRequestMsg" message-
Type="this:receiveRequest"/>
```

```xml
    <bpel:variable name="thisReceiveResponseMsg" message-
Type="this:receiveResponse"/>
  </bpel:variables>
  <bpel:sequence>
    <bpel:receive partnerLink="clientAndFlow_5PlkVar" port-
Type="this:ForClient" operation="receive" varia-
ble="thisReceiveRequestMsg" createInstance="yes" bpmn:label="receive"
bpmn:id="_f1it0LezEd2SefdpxuIA7w"></bpel:receive>
    <bpel:assign name="init-variables-Flow_5">
      <bpel:copy bpmn:label="$thisReceiveResponseMsg">
        <bpel:from>
          <bpel:literal>
<this:receiveResponse>
  <tns:message></tns:message>
  <tns:adjustment_method></tns:adjustment_method>
</this:receiveResponse></bpel:literal>
        </bpel:from>
<bpel:to>$thisReceiveResponseMsg.body</bpel:to>
      </bpel:copy>
    </bpel:assign>
    <bpel:scope
name="ad_hoc_purchase_WMCc8bezEd2SefdpxuIA7w" bpmn:label="ad
hoc purchase" bpmn:id="_WMCc8bezEd2SefdpxuIA7w">
      <bpel:variables>
        <bpel:variable
name="axis2Nonmember_commodity_purchase_operationRequestMsg"
message-
Type="axis2:Nonmember_commodity_purchase_operationRequest"/>
        <bpel:variable
name="axis2Nonmember_commodity_purchase_operationResponseMsg"
message-
Type="axis2:Nonmember_commodity_purchase_operationResponse"/>
      </bpel:variables>
      <bpel:sequence>
        <bpel:assign name="init-variables-ad_hoc_purchase">
          <bpel:copy
bpmn:label="$axis2Nonmember_commodity_purchase_operationRequest
Msg">
            <bpel:from>
              <bpel:literal>
<ns:Nonmember_commodity_purchase_operation>
  <ns:commodity_id></ns:commodity_id>
  <ns:name></ns:name>
  <ns:address></ns:address>
  <ns:mail_address></ns:mail_address>
  <ns:adjustment_method></ns:adjustment_method>
</ns:Nonmember_commodity_purchase_operation></bpel:literal>
            </bpel:from>
<bpel:to>$axis2Nonmember_commodity_purchase_operationRequestMsg
.parameters</bpel:to>
          </bpel:copy>
        </bpel:assign>

    <bpel:empty bpmn:label="EventStartEmpty"
bpmn:id="_WMCc97ezEd2SefdpxuIA7w"/>
    <bpel:if>
      <bpel:condition>(("" != $thisReceiveRe-
questMsg.body/tns:name/text()) and ("" != $thisReceiveRe-
questMsg.body/tns:address/text())) and (("" != $thisReceiveRe-
questMsg.body/tns:adjustment_method/text()) and (("" != $thisReceive-
RequestMsg.body/tns:mail_address/text()) and ("" != $thisReceiveRe-
questMsg.body/tns:commodity_id/text())))</bpel:condition>
<bpel:if
<bpel:condition>($thisReceiveRequestMsg.body/tns:adjustment_method/t
ext() = "Bank transfer") or ("digital cash" = $thisReceiveRe-
questMsg.body/tns:adjustment_method/text())</bpel:condition>
        <bpel:sequence>
          <bpel:assign bpmn:label="invoke&#13;&#10;ad
hoc_purchase_operation" bpmn:id="_092u4Le0Ed2SefdpxuIA7w">
            <bpel:copy>
<bpel:from>$thisReceiveRequestMsg.body/tns:adjustment_method</bpel:
from>
<bpel:to>$axis2Nonmember_commodity_purchase_operationRequestMsg
.parameters/ns:adjustment_method</bpel:to>
            </bpel:copy>
            <bpel:copy>
<bpel:from>$thisReceiveRequestMsg.body/tns:commodity_id</bpel:from
>
<bpel:to>$axis2Nonmember_commodity_purchase_operationRquestMsg.
parameters/ns:commodity_id</bpel:to>
            </bpel:copy>
            <bpel:copy>
<bpel:from>$thisReceiveRequestMsg.body/tns:name</bpel:from>
<bpel:to>$axis2Nonmember_commodity_purchase_operationRequestMsg
.parameters/ns:name</bpel:to>
            </bpel:copy>
            <bpel:copy>

<bpel:from>$thisReceiveRequestMsg.body/tns:address</bpel:from>
<bpel:to>$axis2Nonmember_commodity_purchase_operationRequestMsg
.parameters/ns:address</bpel:to>
            </bpel:copy>
            <bpel:copy>
<bpel:from>$thisReceiveRequestMsg.body/tns:mail_address</bpel:from>
<bpel:to>$axis2Nonmember_commodity_purchase_operationRequestMsg
.parameters/ns:mail_address</bpel:to>
            </bpel:copy>
          </bpel:assign>
          <bpel:invoke partner-
Link="servicesAndFlow_5ForSales_ServiceSOAP11port_httpPlkVar"
portType="axis2:Sales_ServicePortType" opera-
tion="Nonmember_commodity_purchase_operation" inputVaria-
ble="axis2Nonmember_commodity_purchase_operationRequestMsg"
outputVaria-
ble="axis2Nonmember_commodity_purchase_operationResponseMsg"
```

```
bpmn:label="invoke&#13;&#10;ad hoc_purchase_operation"
bpmn:id="_092u4Le0Ed2SefdpxuIA7w"></bpel:invoke>
<bpel:if>                    <bpel:condition>"database_access_failed" !=
$axis2Nonmember_commodity_purchase_operationResponseMsg.parame
ters/ns:return</bpel:condition>
            <bpel:sequence>
                <bpel:assign bpmn:label="compose purchase done
message" bpmn:id="_WMCc_bezEd2SefdpxuIA7w">
                    <bpel:copy>
                        <bpel:from>"購入が成功しました。会員登
録を行うと、入力項目を減らすことができます。"</bpel:from>
<bpel:to>$thisReceiveResponseMsg.body/tns:message</bpel:to>
</bpel:copy>                    <bpel:copy>
<bpel:from>$thisReceiveRequestMsg.body/tns:adjustment_method</bpel:
from>

<bpel:to>$thisReceiveResponseMsg.body/tns:adjustment_method</bpel:t
o>
                    </bpel:copy>
                </bpel:assign>
                <bpel:empty bpmn:label="EventEndEmpty"
bpmn:id="_WMCc_7ezEd2SefdpxuIA7w"/>
            </bpel:sequence>
            <bpel:else>
              <bpel:sequence>
                <bpel:empty bpmn:label="db admin action"
bpmn:id="_WMCc_rezEd2SefdpxuIA7w"/>
                    <bpel:exit bpmn:label="force end"
bpmn:id="_WMCdALezEd2SefdpxuIA7w"/>
                </bpel:sequence>
              </bpel:else>
            </bpel:if>
        </bpel:sequence>
        <bpel:else>
          <bpel:sequence>
            <bpel:assign bpmn:label="compose invalid payme-
thod message" bpmn:id="_WMCdArezEd2SefdpxuIA7w">
                <bpel:copy>
                    <bpel:from>"購入方法は、"Bank transfer"又
は"digital cash"以外は選べません。"</bpel:from>
<bpel:to>$thisReceiveResponseMsg.body/tns:message</bpel:to>
</bpel:copy>
                </bpel:assign>
                <bpel:empty bpmn:label="EventEndEmpty"
bpmn:id="_WMCc_7ezEd2SefdpxuIA7w"/>
            </bpel:sequence>
          </bpel:else>
        </bpel:if>
      <bpel:else>
        <bpel:sequence>
```

```
            <bpel:assign bpmn:label="compose
&quot;reinput&quot; message"
bpmn:id="_WMCc9rezEd2SefdpxuIA7w">
            <bpel:copy>
                <bpel:from>"記入漏れがあります。再入力をお
願いします。"</bpel:from>
<bpel:to>$thisReceiveResponseMsg.body/tns:message</bpel:to>
            </bpel:copy>
            </bpel:assign>
            <bpel:empty bpmn:label="EventEndEmpty"
bpmn:id="_WMCc_7ezEd2SefdpxuIA7w"/>
        </bpel:sequence>
      </bpel:else>
    </bpel:if>
  </bpel:sequence>
  </bpel:scope>
  <bpel:reply partnerLink="clientAndFlow_5PlkVar" port-
Type="this:ForClient" operation="receive" varia-
ble="thisReceiveResponseMsg" bpmn:label="reply"
bpmn:id="_hinToLezEd2SefdpxuIA7w"></bpel:reply>
  </bpel:sequence>
</bpel:process>
```

Figure 3: BPEL corresponding to Figure 1 Example.

```
<?xml version='1.0' encoding='utf-8'?>
<wsdl:definitions xmlns:ns="http://Sales_Service/xsd"
xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
xmlns:xs="http://www.w3.org/2001/XMLSchema"
xmlns:xml="http://www.w3.org/XML/1998/namespace"
xmlns:axis2="http://Sales_Service/"
xmlns:bpel="http://docs.oasis-open.org/wsbpel/2.0/process/executable"
xmlns:diag="http://example.com/NewDiagram"
xmlns:Services="http://example.com/NewDiagram/Services"
xmlns:tns="http://www.example.org/messages"
xmlns:vprop="http://docs.oasis-open.org/wsbpel/2.0/varprop"
xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
xmlns:pnlk="http://docs.oasis-open.org/wsbpel/2.0/plnktype"
xmlns:this="http://example.com/NewDiagram/Flow_5"
xmlns:Client="http://example.com/NewDiagram/Client"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" targetNa-
mespace="http://example.com/NewDiagram/Flow_5">
    <wsdl:types>
        <xs:schema elementFormDefault="qualified" targetNames-
pace="http://example.com/NewDiagram/Flow_5">
            <xs:import names-
pace="http://www.example.org/messages" schemaLoca-
tion="message.xsd"/>
            <xs:element name="receiveRequest"
type="tns:hi-kaiinnkounyuu_input"/>
            <xs:element name="receiveResponse"
type="tns:hi-kaiinnkounyuu_output"/>
```

```
    </xs:schema>
  </wsdl:types>
  <wsdl:message name="receiveRequest">
      <wsdl:part name="body" element="this:receiveRequest"/>
  </wsdl:message>
  <wsdl:message name="receiveResponse">
      <wsdl:part name="body" element="this:receiveResponse"/>
  </wsdl:message>
  <wsdl:portType name="ForClient">
      <wsdl:operation name="receive">
          <wsdl:input message="this:receiveRequest"
name="receive"/>
          <wsdl:output message="this:receiveResponse"
name="receiveResponse"/>
      </wsdl:operation>
  </wsdl:portType>
  <wsdl:binding name="CanonicBindingForClient"
type="this:ForClient">
      <soap:binding style="document" trans-
port="http://schemas.xmlsoap.org/soap/http"/>
      <wsdl:operation name="receive">
          <soap:operation style="document" soapAc-
tion="http://example.com/NewDiagram/Flow_5/ForClient/receive"/>
          <wsdl:input name="receive">
              <soap:body use="literal"/>
          </wsdl:input>
```

Figure 4: WDSL corresponding to Fig.1 Example.

```
<?xml version="1.0" encoding="UTF-8"?>
<schema xmlns="http://www.w3.org/2001/XMLSchema"
targetNamespace="http://www.example.org/messages"
xmlns:tns="http://www.example.org/messages"
elementFormDefault="qualified">
<complexType name="kaiinntouroku_input">
<sequence>
<element name="user_id" type="int"></element>
<element name="password" type="string"></element>
<element name="name" type="string"></element>
<element name="address" type="string"></element>
<element name="mail_address" type="string"></element>
 </sequence>
 </complexType>
 <complexType name="kaiinntouroku_output">
<sequence>
<element name="message" type="string"></element>
</sequence>
</complexType>
<complexType name="kaiinntourokusakuzyo_input">
<sequence>
<element name="user_id" type="int"></element>
<element name="password" type="string"></element>
```

```
</sequence>
</complexType>
<complexType name="kaiinntourokusakuzyo_output">
<sequence>
<element name="message" type="string"></element>
</sequence>
</complexType>
```

Figure 5: XML Schema corresponding to Example.