
Constructing E-Tourism Platform Based on Service Value Broker *-----A Knowledge Management Perspective*

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KMBA2013 in IEEE BigData2013 , October 6th , 2013, *Santa Clara, CA, USA*

Outline of the presentation

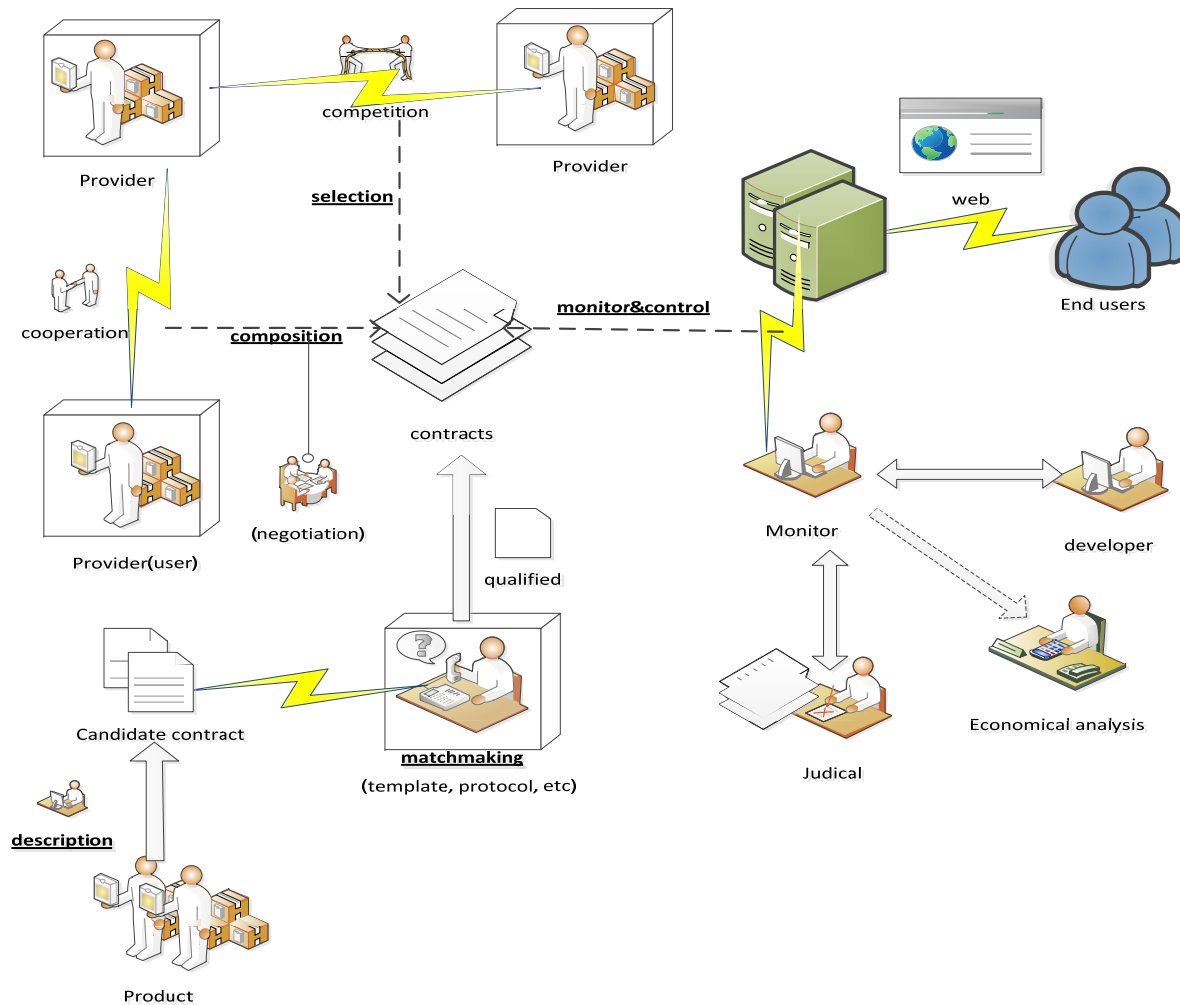
- **Service Contract and Service Value Broker (SVB)**
 - **SVB scenario: E-Tourism case study.**
 - **Construction of SVB based E-Tourism platform.**
 - **Model the added value for E-Tourism parties.**
 - **Experiment: Personal recommendation system.**
 - **Conclusion and Future work**
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Example of E-Contract:

Example service contract of IaaS service Linode 512 (<http://www.linode.com>)

Service Attribute	Attribute Value
<i>Identifier</i>	Linode 512
<i>Description</i>	The hosting of virtual private servers from the cloud datacenter.
<i>Provider</i>	Linode, LLC
<i>Consumer</i>	ACME Ltd.
<i>Price</i>	\$19.95 / month
Service Attribute	Attribute Value
<i>Quantity</i>	1 server instance consisting of:
- <i>RAM</i>	512MB
- <i>storage</i>	16GB
- <i>transfer</i>	200GB
<i>Quality</i>	Features – full SSH and root access, guaranteed resources, 4 processor Xen instances, out of band console shell, dedicated IP address, HA and clustering support, bandwidth pooling, managed DNS with API, manager support ticket system
<i>Rules</i>	chosen datacenter – London (UK)
<i>Provisioning</i>	Consumer signs up service through the service website (http://www.linode.com/), fills in company data and pays for the service with signed-up credit card on the regular monthly basis. Consumer completely administrates rented server through administration interface and SSH. Provider takes care of the availability, performance and extensions of the cloud environment. In the case of any problem, consumer could contact provider through the support ticket system and provider should appropriately respond and solve the problem.

Service Contract in E-service



SVB is used to increase the added value for multiple parties

SVB Introduction:

Service Value Broker (SVB): driven by a value based goal, when a direct service composition cannot meet some required constraints from the service contract [2] or service level agreement(SLA) such as response time, location, license area, available period, currency format. If an introduction of an intermediate service can help to solve these problems and enable a service composition to be qualified, the introduced intermediate service is a *SVB*.

SVB Introduction:

Traditional broker

Quality driven - For constructing a traditional broker, a composing service is chosen based on the order of the *quality* of its functionality. And for a set of composing services, the priority is in ratio to:
$$\sum_{integration} (quality)_{i...n} \cdot$$

Service Value Broker

Price/quality driven - For constructing a SVB, a composing service is chosen based on the order of the *price/quality* of its functionality. And for a set of composing services, the priority is in ratio to:
$$\sum_{integration} (price/quality)_{i...n} + \Delta_{valueadded} \cdot$$

SVB brokers scenarios: E-tourism case study

We denote:

- The contract on the source end of an exchange as CS .
 - The contract on the target end of an exchange as CT .
 - The input of a SVB contract as $iSVB$
 - The output of a SVB contract as $oSVB$
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SVB brokers scenarios: E-tourism case study

Location ($LC \in \mathbb{D}_S$): requests are restricted to be "requested within France" while the customer want to visit "from Italy".

Problem: $LC|_{CS} \neq LC|_{CT}$

Location broker: a service which "accepts requests from Italy" and located in France has the possibility of playing the broker.

Solution: $(LC|_{CS} = LC|_{iSVB}) \text{ AND } (LC|_{oSVB} = LC|_{CT})$

SVB brokers scenarios: E-tourism case study

Information privacy: ($IP \in \mathbb{D}_S$) during a transaction, some pieces of information which are not required or are not necessary for a transaction might be required or leaked without notice.

Information privacy broker: a service which checks and restricts the usages of service information based on a necessary-only policy may play the broker.

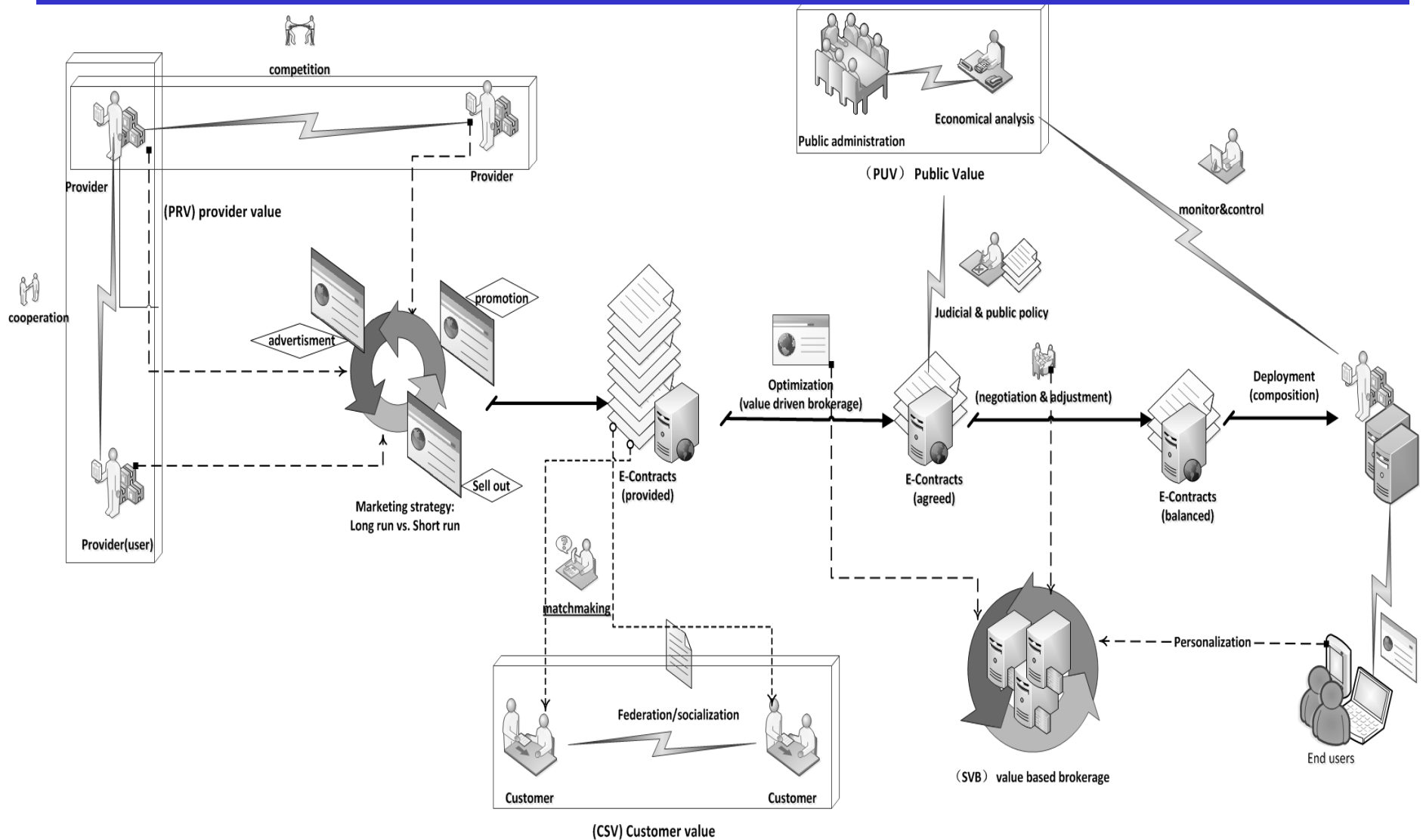
Solution: $(IP|_{CS} \rightarrow (check(access)|_{iSVB} AND validate(necessary)|_{iSVB}))$

SVB brokers scenarios: E-tourism case study

Horizontal composition: We take the *Currency broker* as an example. The payment is restricted to be "Czech Koruna" while the customer has only "Thai Baht". If a *Currency exchange broker (a)* which exchange "Thai Baht" to "Euro", and a *Currency exchange broker (b)* which exchange "Euro" to "Czech Koruna" are available. The connection of the two brokers will construct a solution from this customer to the provider.

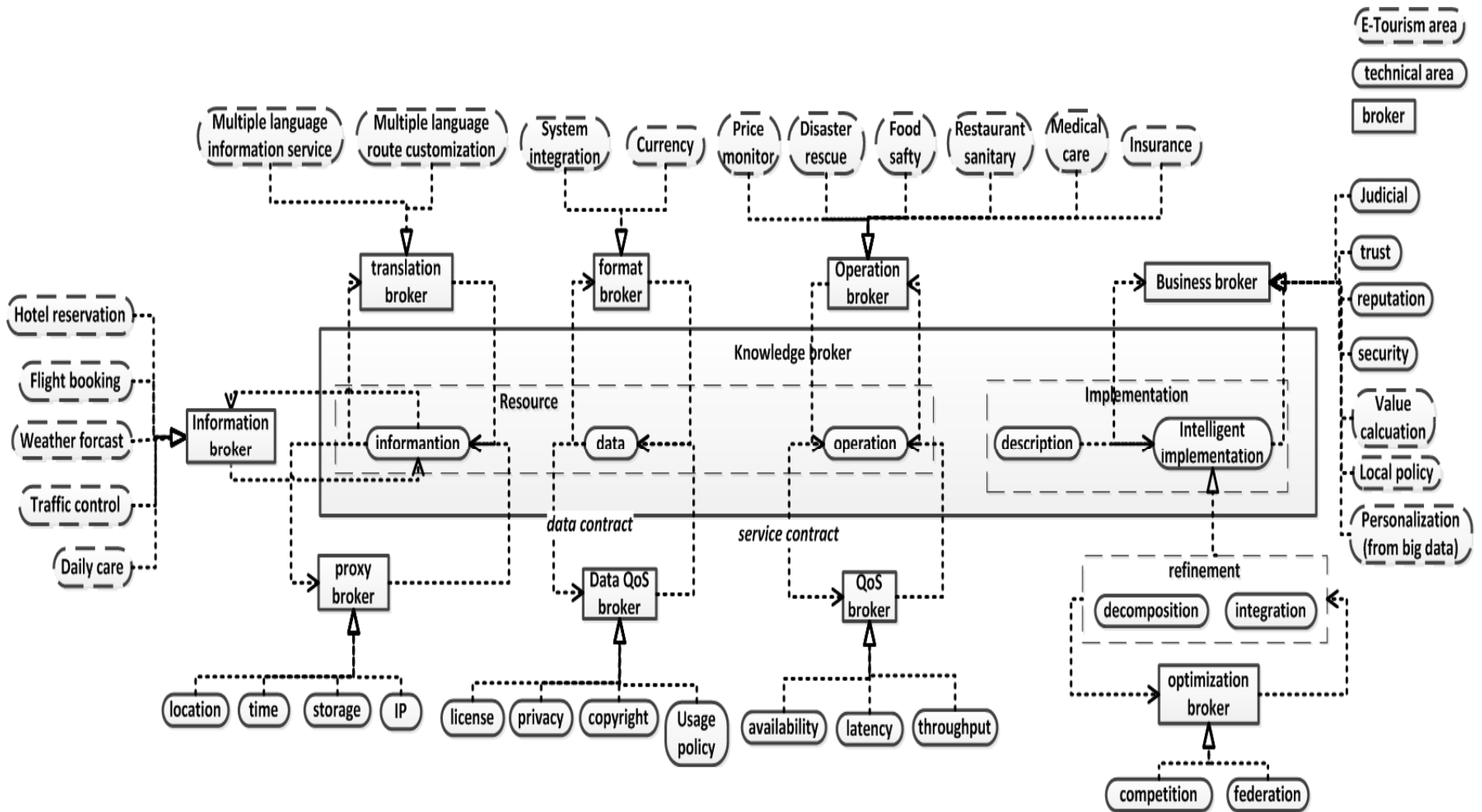
$$\begin{aligned} \text{Solution:} \quad & (CE|_{CS} = \\ & CE|_{iSVB(a)} \text{ AND } (CE|_{oSVB(a)} = \\ & CE|_{iSVB(b)} \text{ AND } (CE|_{oSVB(b)} = CE|_{CT}) \end{aligned}$$

SVB based E-Tourism platform: general view



Integrating value considerations from multiple stakeholder with value brokerage

Classification of SVB from the perspective of Knowledge management:



SVB based E-Tourism platform

- 1) *Provider value (PRV)* -
 - *Negative competitive cost* - Negative competitive cost occurs when other business competitors who offer similar services bid for the same order or market.
 - *Positive cooperative wins* - When service vendors who offer related or similar services agree on some fixed conditions such as market share, sells area, etc, they can build some cooperations to profit from the customer side such as lifting the price of services or charges of maintenance, etc.

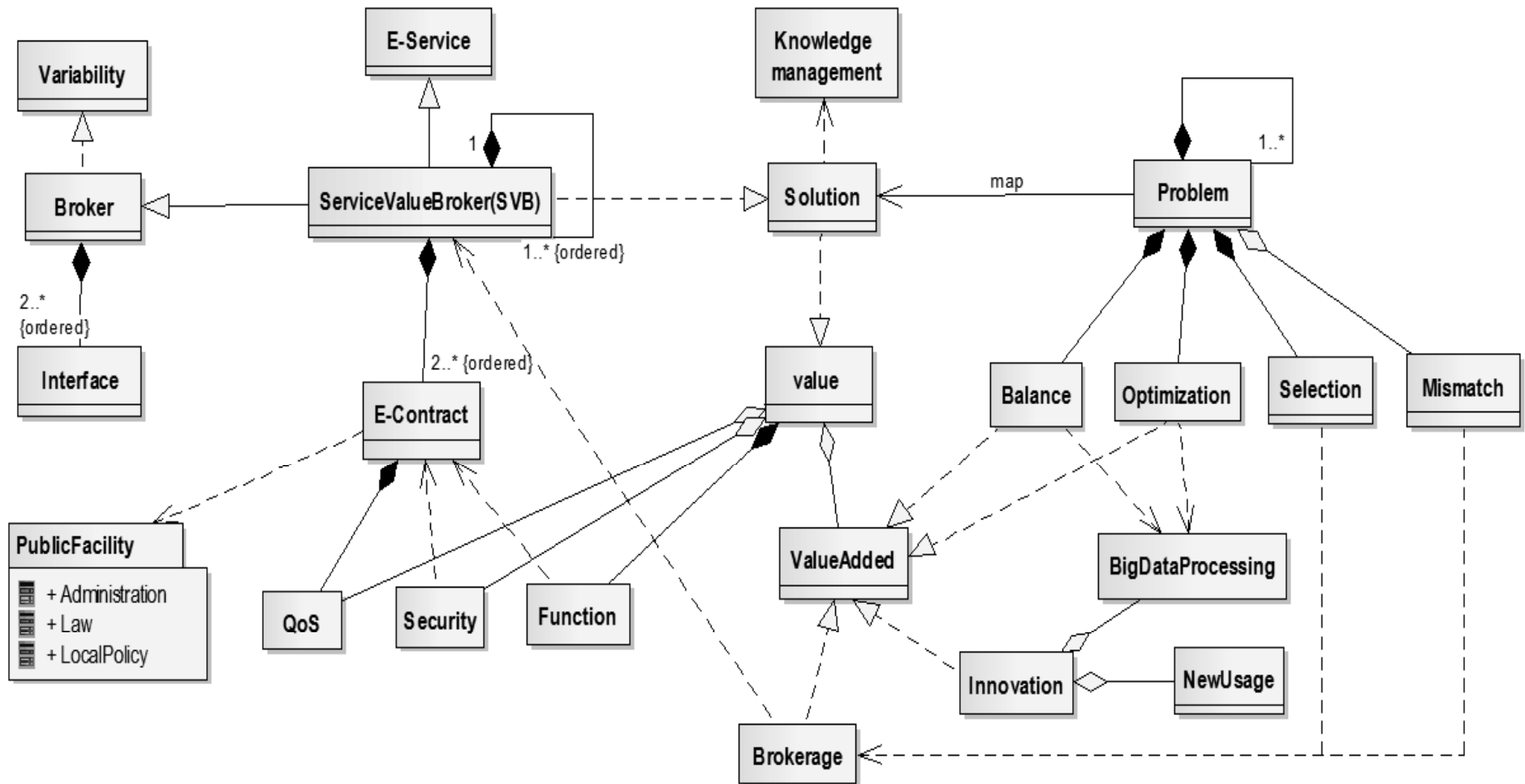
SVB based E-Tourism platform

- 2) *Customer value (CSV)* - Service customers in general have independent views on the value of the targeted services. However customers can socialize with other customers to query the quality of a service from others' experiences and comments. The experience information or news/advertisement propagated through social media among customers is playing an increasing role in promoting sales and adjusting commerce behavior.

SVB based E-Tourism platform

- 3) *Public value (PUV)* - The public administration is the third party which can play the juridical role for solving the argumentation. The public administration also has other critical responsibilities: (i) monitor the service market through economical analysis to avoid the competition between the provider and customer side to enter an Zero-Sum game; (ii) employ public policies to intervene the strong cooperation against customer interests at the provider side, or collusive customers [28], etc.

Meta Model design of E-tourism based on SVB:



The model of added value

A. Sources of value added

- *Added value of PRV*

$$\Delta_{PRV} (X_P) = \Delta_{req} * \Delta_{price}$$

- *Added value of CSV*

$$\Delta_{CSV} (X_C) = \Delta_{pay} + \Delta_{sat} + \Delta_{cos}$$

The model of added value

- *Added value of PUV*

- *Added value of PUV_{competition}*

$$\Delta_{competition} = \sum \text{avoid}(\text{loss}(\text{PRV})) - \text{cost}(\text{interfere}(\text{PUV}))$$

- *Added value of PUV_{cooperation}*

$$\Delta_{cooperation} = \sum \text{avoid}(\text{loss}(\text{CSV})) - \text{cost}(\text{interfere}(\text{PUV}))$$

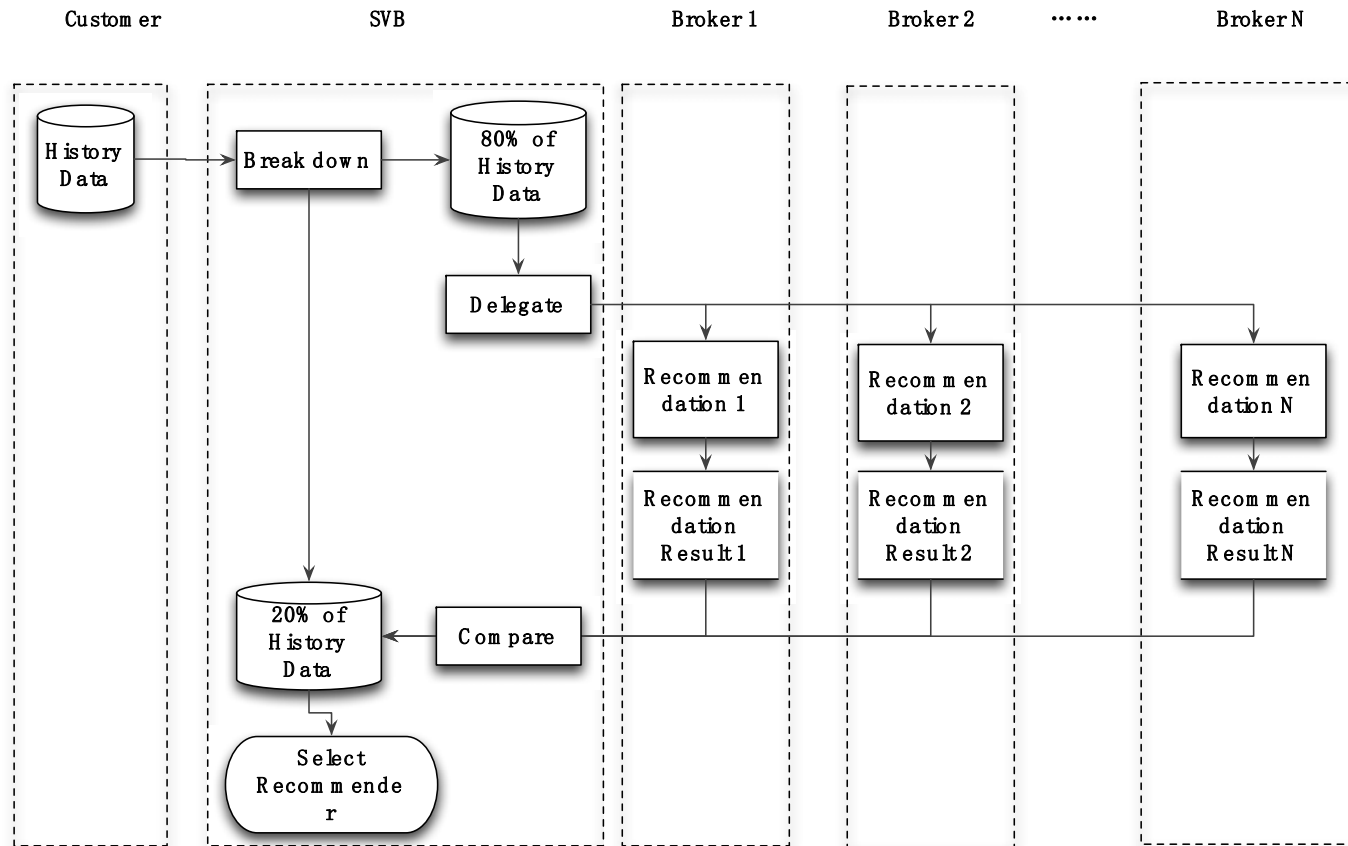
- *Added value of PUV_{security}*

$$\Delta_{security} = \sum \text{avoid}(\text{malpractice}) - \text{cost}(\text{security}(\text{PUV}))$$

$$\Delta_{PUV} = \sum \Delta_{competition} + \sum \Delta_{cooperation} + \sum \Delta_{security}$$

Experiment

Our system offers a value based brokerage service to make personalized restaurant recommendation for new customer based on previous customer's rating history.



Experiment

Mahout Recommender

UC Irvine's machine Learning repository "Restaurant Consumer Data" (1161 instance of rating information)

Mean squared errors with different similarity measurements in E-Tourism SVB scenario

Broker #	Similarity Measurement	Average MSE
1	Co-occurrence	1.800
2	Log likelihood	1.797
3	Tanimoto coefficient	1.814
4	city block	1.803
5	cosine	1.795
6	pearson correlation	1.452
7	euclidean distance	1.795

CONCLUSION

- Service value broker (SVB) is a critical element for constructing a coming era of E-Service Economics.
 - We propose to build a problem solving framework of a smart E-Tourism from a knowledge management base on the SVB.
 - SVB improves the profiting on the *provider* side, the satisfaction on the *customer* side and the efficiency and precision of the market surveillance and control from the *public administrative* side.
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FUTURE WORK

- Improve the added value modeling modules on each parties and consider comprehensive business application.
 - Apply the prototype system to collect first hand feedback from the E-Tourism markets in Hainan province.
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Thanks for your attention!

Please contact us if your work is or will be related to service contract, service value, service design pattern, etc.

Welcome for collaboration and joint work.

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