Research Project of Service Engineering

Ministry of Economy, Trade and Industry

Service Affairs Policy Division
Service Engineering

- Service Engineering: Innovative technologies on observation, analysis and modeling of service providers, receptors and service process to improve productivity of service business.
- Scientific and engineering methods are applied to a part of service business that is covered by implicit institution and personal experiences.
- Those methods are distributed as general technological modules
Strategy of Technical Development

Observation
Selection of effective measurement items

Understanding
of service providers, receptors and service process

Sensing
of service providers, receptors and service process through actual services

Analysis

Modeling
of large-scale data of service providers, receptors and service process

Design
Improvement of values and efficiency

Simulation
of behaviors of service providers, receptors in service process to aid service design

Application

Validation
of new service design through actual services

Outcomes

Methods to understand services using interviews, questionnaires and physical measurements are established (CCE: Cognitive Chrono-Ethnography)

Integrated sensing technologies (e.g. environmental sensing, wearable sensing, web sensing, virtual sensing)

Modeling technologies for large scale data of services (BN: Bayesian networks)

Simulation technologies of receptor's behavior in services
Service Process CAD

Optimization technologies for service process

Improvement of values and efficiency
Hierarchical Structure of Services

Providing layer
- Service site
- Service recommendation technologies
- Understanding methods & Sensing technologies

Supporting layer
- Collaborating aids among staffs/providers
- Modeling technologies of large-scale data
- Collaborating aids among institutes
- Understanding methods for daily living

Collaboration layer

Customer Satisfaction
Employee Satisfaction
Social Satisfaction
Outcomes: General Technological Modules

**Observation**
- Methods to understand services
  Establish CCE that includes depth interviews using behavioral monitoring (considering repeatability and generality)
- Integrated sensing technologies
  Integrate wearable, environmental and web sensors to achieve the sufficient accuracy in low-cost

**Analysis and Design**
- Modeling technologies of large-scale data
  Improve the performance of Bayesian networks by initial modeling technologies based on CCE and optimal segmentation technologies of receptors and products
- Simulation technologies of receptor’s behavior
  Visualize service process and receptor’s behavior to aid service design

**Application**

**Entertainment services**
- Understanding and modeling of transition of fan stages due to perceived messages at the site or in the community

**Retail services**
- Modeling of purchasing behavior changes due to customers’ attributes, histories and perceived messages

**Health-care services**
- Modeling of changes of the state of personal health from customers’ attributes, conditions and histories
Entertainment services project

**Problem:** Entertainment services processes can be optimized by appropriately understanding how the recipients of the services enjoy the entertainment.

**Solution:** Understanding service recipients behavior by conducting observational studies at the sites of entertainment services followed by a series of structured depth interviews by using the behavioral records as retrieval cues. A theoretically motivated research methodology, the Cognitive Chrono-Ethnography, will be used.

**Expected outcome:** The outcome of this project will include a set of “service-recipients-loyalty evolution diagrams (FLE diagrams)” that represents how each service recipient has evolved his/her loyalty by specifying triggers for stage changes, and circumstances that make him/her stay at a particular stage. When designing services, the stage transition representation will be used to stimulate potential services’ recipients to increase their loyalty level.
Methods to understand service receivers

- CCE (cognitive chrono-ethnography)
  - Selection of suitable subjects
  - Behavioral measurement through the services
  - Interview with presentation of behavioral data
Sensing technologies through real services

• Yukata Credit
  – Deposit system using users own felica card
  – System uses only felica ID
  – Available for public bath fee and shopping of souvenirs
  – Sensing the behavioral data through services
Retail service project

**Problem**: Retail process can be optimized by promotion, merchandising, presentation, discounting and so on. But still these are operated by human skill, not technology.

**Solution**: Bayesian network modeling technology, large scale point-of-sales data with customer ID, behavior based psychological research and behavior understanding technology.

**Expected outcome**: Merchandising and customer relation management system based on frequency shopper’s program, intelligent digital signage system and developing customer’s everyday life assistance services, quality management framework for everyday life.
Category Mining technologies

• Automatic & Real-time categorization of customers and merchandise

<table>
<thead>
<tr>
<th>Cluster 1</th>
<th>Cluster 2</th>
<th>Cluster 3</th>
<th>Cluster 4</th>
<th>Cluster 5</th>
<th>Cluster 6</th>
<th>Cluster 7</th>
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<td>シャンプー XIX</td>
<td>シャンプー XIX</td>
<td>無流米</td>
<td>CS製品警報機もしくは遮音筒</td>
<td>シャンプー XIX</td>
<td>CS製品警報機もしくは遮音筒</td>
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<td>CS製品警報機もしくは遮音筒</td>
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<td>211件</td>
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<td>5件</td>
<td>4件</td>
<td>3件</td>
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Categorized merchandise

商品の傾向とそのクラスタに所属する確率が最も高かった顧客IDの数

- [205人]
- [178人]
- [245人]
- [202人]
- [158人]
- [182人]
**Problem**: Customers receive health-care services from several health-care centers, where many staffs such as doctors, nurses and etc. are working as service providers. Customer information sharing among staffs in a health-care center and also between health-care facilities is important to improve quality, productivity and security of the services.

**Solution**: Surveillance of shared information, coordinated operation between staffs at “Keiju Medical Center” and “Supercourt”.

**Expected outcome**: Skill model based on implicit knowledge of expert to acquire or apply customer information for training system. Efficient and effective information share system to facilitate coordinated operation between staffs or service providers. Evaluation indices of service processes from a customer’s point of view.
# Service process CAD

## フロー

1. **面談**
   - 入居審査
     - 可
     - 可 (End)
     - 不可
     - 不可 (End)

2. **入居準備**
3. **入居**
4. **介護・支援**
5. **観察**
   - 問題なし
   - 問題あり
     - 状態悪化
     - 諸事情
       - 転院・退所
       - End

## 情報

<table>
<thead>
<tr>
<th>入居者・家族</th>
<th>健康診断書</th>
<th>家族情報</th>
<th>通院歴・病歴</th>
<th>介護度情報</th>
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<td>看護師</td>
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## 他の施設・人

- 病院・特養・老健
- 病院・特養・老健
- 病院・特養・老健
- 往診医師
Outcomes: Collaboration of Services

- Entertainment
- Methods to understand services
- Sensing technologies
- Modeling technologies
- Simulation technologies
- Service process CAD
- Health-care
- Retail

Service collaboration