Proposal and field practice of a method for promoting CMC hiyarihatto activity

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Introduction

- **Hiyarihatto activity**
  - Effective activity for cultivation of safety attitude
  - Discussion in a small group
  - Topics are hiyarihatto (incident cases)
  - Face-to-face discussion (SHIGEMORI 2009)

- **Hiyarihatto activity in nuclear power plants**
  - It is difficult to continue the activity.
  - Participants are busy.
  - Geographically dispersed

- **Purpose of this study**
  - To propose a method for promoting hiyarihatto activity in nuclear power plants
    - Asynchronous and distributed CMC (Computer Mediated Communication)
    - Socio psychological method for promoting talking
Target participants in this study

- Field supervisors
  - Are reasonable for field works in nuclear power plants.
  - Lead field workers’ safety attitude.
Requirements of hiyarihattoo activity in nuclear power plants(1)

- Practicable in nuclear power plant organization
  - Continue without disturbing other works

- Anonymousness
  - To avoid hesitation to talk
  - It is difficult to talk about their own incidents.

- Spontaneous participation
  - For continuous activity (HORIE 2007)
  - Self determination theory (DECI 1996)
Requirements of hiyarihatto activity in nuclear power plants (2)

- Encouraging speaking
  - To avoid social loafing (LATANE 1981)

- Encouraging of thinking about causes and measures of incident cases
  - To cultivate safety attitude through understanding and enhancing sensitivity to incidents (SHIGEMORI 2009)

- Geographically separated participants can easily participate
  - separated participants have useful knowledge for sharing
Problems of an existing method

- An example of hiyarihatto activity method (SHIGEMORI 2009)
  - Face to Face discussion about incidents
    - Anonymous discussion is difficult.
    - Geographically separated participants need much time to gather.
  - Facilitator
    - Encourage speaking.
    - Cannot promote spontaneous participation.
      - Only passive participation
Proposal of a method for promoting hiyarihatto activity in nuclear power plants

- **Asynchronous distributed CMC* hiyarihatto activity**
  - With web-based incident database and electronic bulletin board (BBS) system “hiyarihatto sharing system”

- **Corresponding to requirements**
  - Geographically separated participants can participate easily
  - Anonymousness

- **Participants do**
  1. Submitting incident cases to the database
  2. Reviewing incident cases and discuss these cases in BBS

*Computer Mediated Communication*
The proposed method features
Introduction of active participants

- **Active participants**
  - Corresponding to requirements
    - Encouraging speaking
    - Spontaneous participation
  - One active participant is included in a group.
  - Requested to follow action guidelines (next slide).

- **Three main features**
  1. *Hidden* from normal participants (participants except for active participants).
    - To draw normal participants’ *conformity*
    - To regarded as a normal participant
  2. Behave actively
    - To *increase pace* of posting messages
  3. Control contents of messages
    - To *build a good social relationships* in a group
Action guidelines for active participants

- **To draw conformity** (LATANE 1981)
  1. “Post a message to bulletin board as the beginning of the group”

- **To build a good social relationships** (e.g., BALES 1905, GARRISON et al. 2000)
  2. “Post positive messages such as compliment”
  3. “Agree to messages or incident cases”
  4. “Reply messages if there are no reply”

- **To encourage speaking directly**
  5. “Ask other participants to new messages”
The proposed method features
Introduction of RCA form

- **RCA (Root Cause Analysis)**
  - An analysis method
  - Analyze root causes of accident cases
  - For taking countermeasures against these

- **RCA form**
  - Used in RCA
  - Graphic representation of an accident case
    - An event sequence in the accident
    - Factors (causes) tree of these events
    - Countermeasures to these factors
  - Corresponding to requirements
    - Encouraging of thinking about causes and measures of incident cases
A screenshot of RCA form

Basic information of this case (e.g., date, task process)

Events in this case

Factors which caused events

Factors which caused events

Counter measures for factors

Conditions, factors and measures of case

Factors which caused events

Counter measures for factors

Links to other pages
Field practice of the proposed method

- Purposes of the practice

1. To confirm that normal participants who work in actual nuclear power plants continue the activity with the proposed method
2. To confirm that active participants follow action guidelines
3. To confirm that active participants promote posting messages of normal participants
4. To find improvements of the proposed method
Method of the practice

Data collection
- Time, number, and contents of submitted cases or posted messages in bulletin boards

Partially spontaneous participation
- Request to participate in the practice
- Without disturbing other works
- Freely discuss
An overview of the practice

Kyoto university

Web server

6 active participants
Researcher or veteran worker of normal participants’ company (experience of field work)

30 normal participants
field supervisors of maintenance work

36 participants

Group 1

Group 2

Group 3

Group 4

Group 5

Group 6

3 sites of nuclear power plants
Results and discussions

- Normal participants are classified

<table>
<thead>
<tr>
<th>Average</th>
<th>Login</th>
<th>Visit BBS</th>
<th>Post message</th>
<th>Submit case</th>
<th>#</th>
</tr>
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<tbody>
<tr>
<td>Dropout</td>
<td>7.0</td>
<td>0.3</td>
<td>0.0</td>
<td>1.9</td>
<td>8</td>
</tr>
<tr>
<td>Lurker</td>
<td>13.6</td>
<td>8.9</td>
<td>0.3</td>
<td>3.1</td>
<td>9</td>
</tr>
<tr>
<td>Regular</td>
<td>34.2</td>
<td>77.6</td>
<td>12.8</td>
<td>6.6</td>
<td>9</td>
</tr>
<tr>
<td>Active participant</td>
<td>11.7</td>
<td>50.5</td>
<td>13.8</td>
<td>0.3</td>
<td>6</td>
</tr>
<tr>
<td>Total</td>
<td>19.2</td>
<td>38.7</td>
<td>7.0</td>
<td>3.6</td>
<td>36</td>
</tr>
</tbody>
</table>

#: The number of each type participants

- Normal participants continued the activity
  - except for dropouts and lurkers

- Reasons of being dropout or lurker
  - “I was busy” (from five dropouts and five lurkers)
  - “I am busy in regular facility inspection periods, but I can join the activity in other periods.” (from four normal participants)
Did active participants follow action guidelines?(1)

- Posting order of the first message of active participants in each group

<table>
<thead>
<tr>
<th>Group</th>
<th>Posting Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>3rd</td>
</tr>
<tr>
<td>Group 2</td>
<td>2nd</td>
</tr>
<tr>
<td>Group 3</td>
<td>1st</td>
</tr>
<tr>
<td>Group 4</td>
<td>1st</td>
</tr>
<tr>
<td>Group 5</td>
<td>23rd</td>
</tr>
<tr>
<td>Group 6</td>
<td>1st</td>
</tr>
</tbody>
</table>

- Comment from the active participant of group 5

  “I dropped my guard when other participants submitted cases and posted messages at the beginning of the practice.”
Did active participants follow action guidelines?(2)

- Active participants’ messages are counted.

<table>
<thead>
<tr>
<th></th>
<th>Message request</th>
<th>Reply</th>
<th>Positive Message</th>
<th>Agreement</th>
<th>*Message total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group 2</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>2</td>
<td>19</td>
</tr>
<tr>
<td>Group 3</td>
<td>9</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>14</td>
</tr>
<tr>
<td>Group 4</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>Group 5</td>
<td>7</td>
<td>11</td>
<td>7</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>Group 6</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>6</td>
</tr>
</tbody>
</table>

- Difference between each groups
- Because of ambiguous presentation of action guidelines

*multiple count or uncounted messages are allowed

“Ask other participant to new messages”
Did active participants control normal participants’ contents of messages?

Active participants posted about the same number of messages except for group 6.

But the number of messages of normal participants were far from same.

Positive message encourage posting messages.

Contents of messages of normal participants resemble that of active participants except for group 5.

Active participants controlled contents of messages.

<table>
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<tr>
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<th>Agreement</th>
<th>Message total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>Group 2</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>2</td>
<td>19</td>
</tr>
<tr>
<td>Group 3</td>
<td>9</td>
<td>5</td>
<td>3</td>
<td>3</td>
<td>14</td>
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<tr>
<td>Group 4</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>15</td>
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<tr>
<td>Group 5</td>
<td>7</td>
<td>11</td>
<td>7</td>
<td>3</td>
<td>16</td>
</tr>
<tr>
<td>Group 6</td>
<td>2</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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<th>Reply</th>
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<th>Agreement</th>
<th>Message total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1</td>
<td>3</td>
<td>5</td>
<td>0</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>Group 2</td>
<td>0</td>
<td>19</td>
<td>11</td>
<td>11</td>
<td>30</td>
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<tr>
<td>Group 3</td>
<td>18</td>
<td>38</td>
<td>6</td>
<td>14</td>
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<tr>
<td>Group 4</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Group 5</td>
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<td>13</td>
<td>2</td>
<td>2</td>
<td>32</td>
</tr>
<tr>
<td>Group 6</td>
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<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Proposal of improvements of the proposed method

- A group should include participants from more sites, or more companies.
  - To avoid overlap of regular facility inspection periods
  - Regular facility inspections are conducted in schedules of each site or company.
- Action guidelines should be more clearly presented.
  - In particular, following two guidelines are important.
    - “Post a message to bulletin board as the beginning of the group”
    - “Post positive messages such as compliment”
Summary

- The method for promoting hiyarihatto activity was proposed and practiced in an actual nuclear power plant organization.

- The results showed that
  1. Normal participants who work in actual nuclear power plants continue the activity with the proposed method.
     - It is difficult to continue the activity in regular facility inspection periods.
  2. Active participants followed action guidelines.
     - Action guidelines should be more clearly presented.
  3. Active participants promoted posting messages of normal participants.

- Some improvements of the method were found.