

# A DISCUSSION SYSTEM FOR KNOWLEDGE SHARING AND COLLABORATIVE ANALYSIS OF INCIDENTS IN NUCLEAR POWER PLANTS

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# Introduction

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- Nuclear power plants
  - ▣ Safety critical
- Raising workers' safety awareness.
  - ▣ important



- Discussion of workers about incident

- ▣ Incident
  - ▣ There is few or no damage by chance.
  - ▣ it reveals potential danger.
- ▣ Participants can feel danger's existence and safety behavior's importance



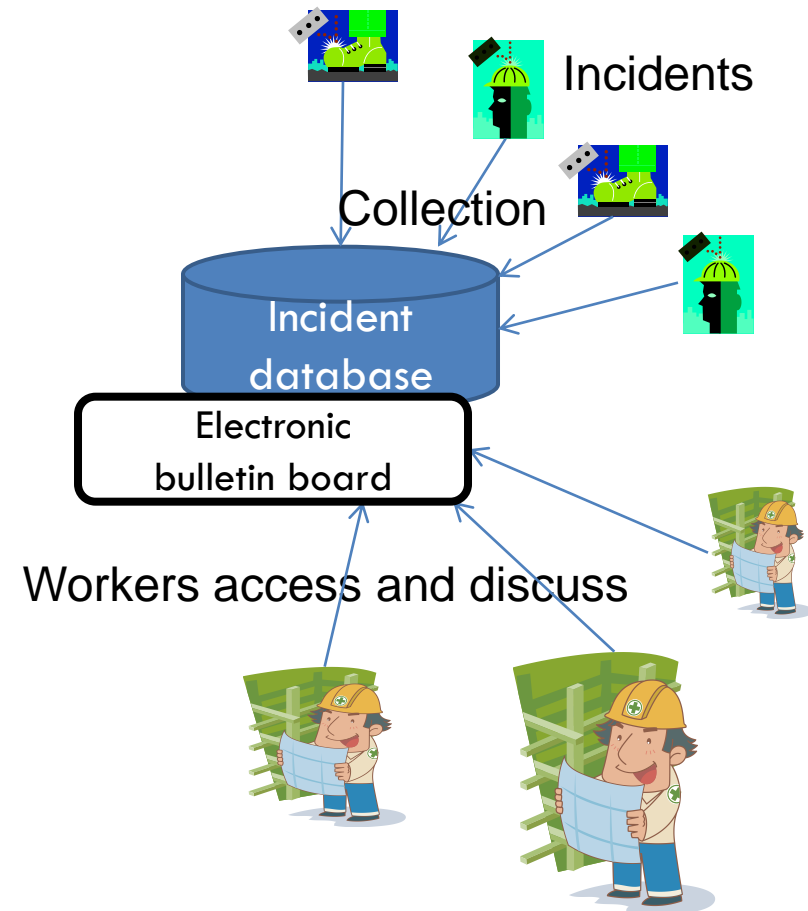
# Problem

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- CMC is appropriate for such discussion
  - Geographically dispersed participant
  - saving time for face to face discussion
- A Japanese electric company has a system
  - For CMC discussion about incident



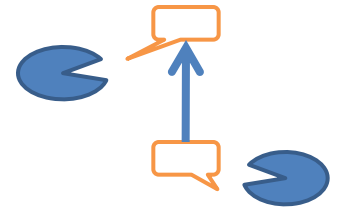
- Incident collection continues.
  - As organizational efforts
- Discussion is deactivated, don't continue.



# Some Factors of (De)activation of Discussion

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- Ease of use
- Perceived usefulness
  - ▣ Use of Information technology discontinue (Legris et al. 2003, Ajzen 1980)
- Social dilemma
  - ▣ Knowledge donating discontinue(Cress et al. 2003)
- Interaction pattern
  - ▣ Interaction deactivation(Suzuki 2005)
- These factors probably cause deactivation in nuclear power plants



# Purpose



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- Some studies for promoting CMC discussion
  - ▣ Not target nuclear power plant
- Purpose of this study
  - ▣ to propose a method to promote discussion about incident in nuclear power plants.
- Study flow
  1. Proposal of the method
  2. Development the system and Realize the method
  3. Practice of the method

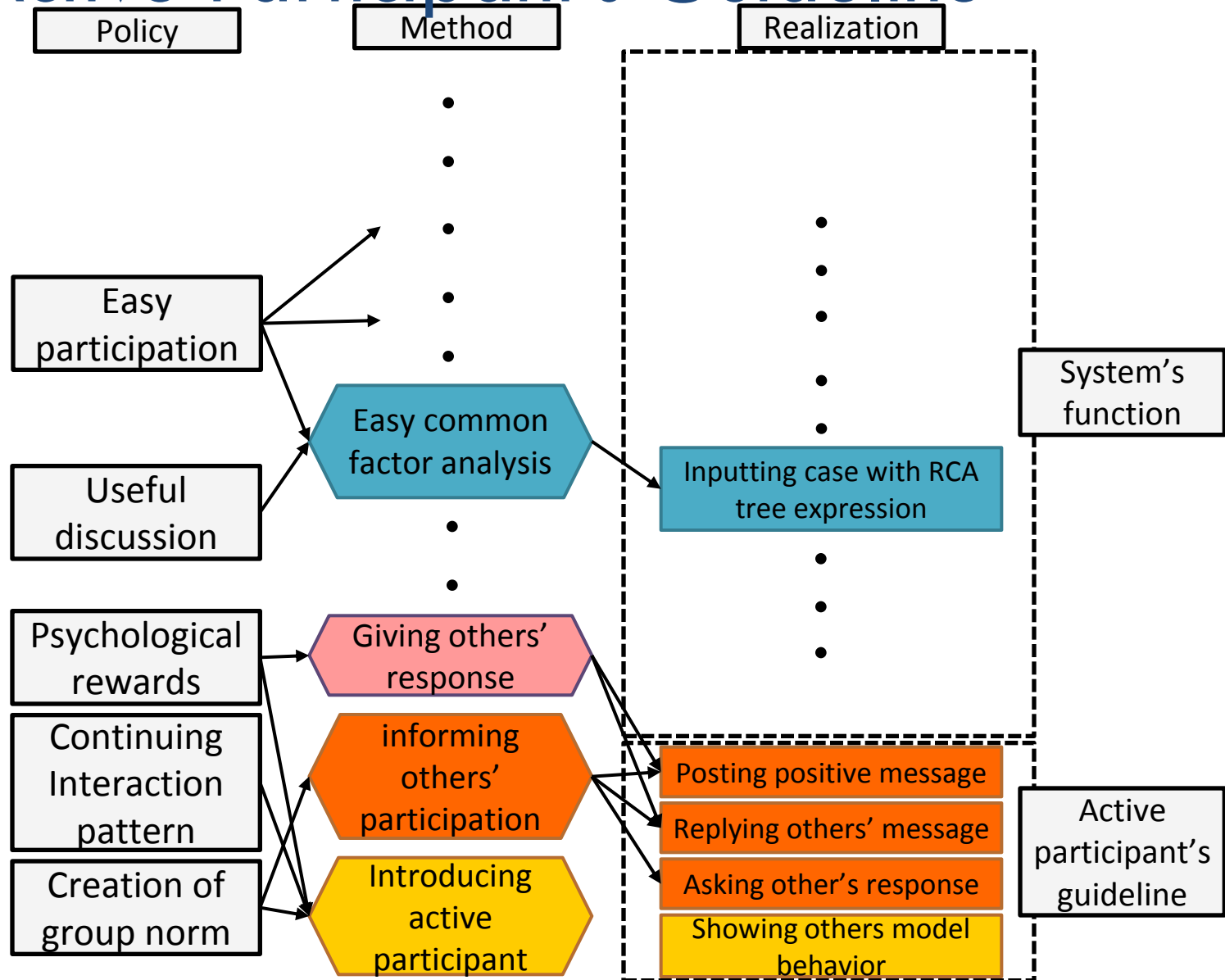


# Proposal of a Method for Promoting Discussion

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- ❑ Target activity
  - ❑ Group discussion (about five participants)
  - ❑ Sharing of case of incident
  - ❑ Web-base CMC discussion
  
- ❑ Promotion without direct control
  - ❑ For continuance (Gange and Deci 2005)
  
- ❑ Promotion with achievement of
  - ❑ Easy participation
  - ❑ Useful discussion
  - ❑ Creation of group norm
  - ❑ Giving psychological rewards
  - ❑ Making continuing interaction pattern
  
- ❑ To achieve these elements, some methods are proposed

# The System's function and Active Participant's Guideline

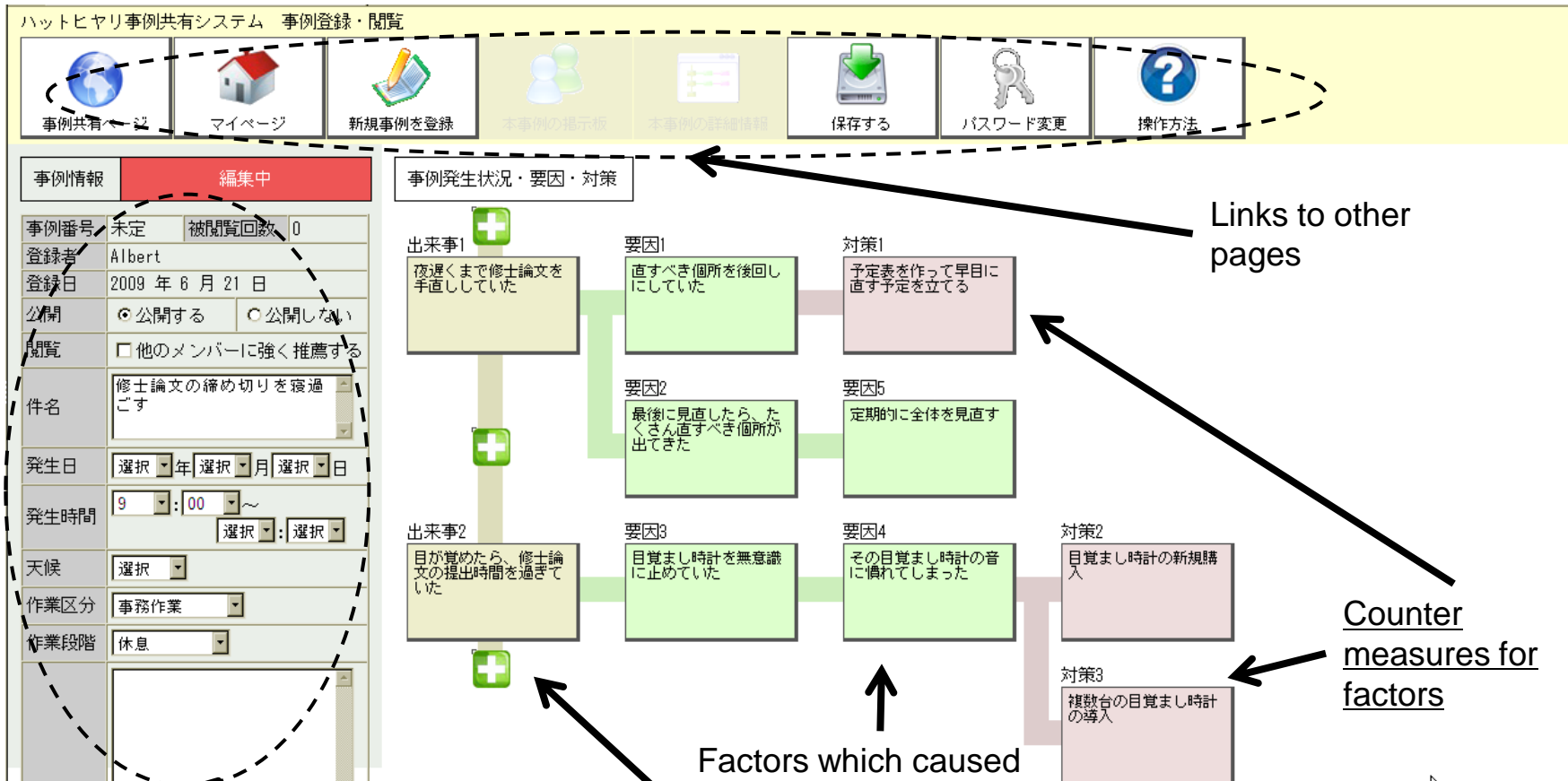


# Discussion System

## Incident Analysis page

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### Tree expression of incident case



Links to other pages

Counter measures for factors

Factors which caused events

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

Events in this case



# Discussion System

## Bulletin boards page

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### □ One case has one thread

A message

Reply to the upper message

Input text of message in this form

ハットヒヤリ事例共有システム 掲示板

事例共有ページ   マイページ   新規事例を登録   本事例の掲示板   本事例の詳細情報   本事例の詳細情報 (別画面で表示)   パスワード変更   操作方法

Name of this case → 事例1の掲示板   被閲覧回数：4  
事例の件名：修士論文の締め切りを寝過ごす  
(事例の詳細を別画面で表示する)

[1] 投稿者：Enrico (あなた)   評価：★   2009-06-21 15:07:03   返信   削除  
僕もよく寝坊するので、気をつけたいと思いました。  
しかし、目覚まし時計を増やしても、それにも慣れてしまうのできりがありません。  
何か根本的な解決はないのでしょうか。

[2] 新規投稿 投稿者：Albert   評価：   2009-06-21 15:09:43   とても役に立った  
ほんとうにそう思います。

返信投稿

投稿する

新規投稿

新規投稿の場合はここにメッセージを入力し、下の「投稿する」ボタンを押してください。  
既存のメッセージに対して返信したい場合は、返信したいメッセージの右上に表示される「返信」ボタンを押すと新たに表示されるフォームを使用して投稿してください。

□ 事例共有ページへの公開メッセージとする。  
(事例共有ページの公開メッセージ欄に投稿内容へのリンクが1週間表示されます。)

投稿する

The screenshot shows a web interface for a discussion system. At the top, there is a navigation bar with icons for '事例共有ページ', 'マイページ', '新規事例を登録', '本事例の掲示板', '本事例の詳細情報', '本事例の詳細情報 (別画面で表示)', 'パスワード変更', and '操作方法'. Below this, the main content area displays a bulletin board for '事例1の掲示板' with 4 views. The case title is '事例の件名：修士論文の締め切りを寝過ごす' with a link to view details. Two messages are shown: message [1] by Enrico (you) from 2009-06-21 15:07:03, and message [2] by Albert from 2009-06-21 15:09:43. Message [2] is a reply to message [1]. Below the messages is a '返信投稿' (reply) form with a text input field and a '投稿する' (post) button. At the bottom, there is a '新規投稿' (new post) form with instructions and a '投稿する' button. Annotations with arrows point to various elements: 'A message' points to message [1], 'Reply to the upper message' points to message [2], and 'Input text of message in this form' points to the '返信投稿' form.

# Active Participant



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- Requested to make discussion activated.
- Ordinary participants are not told
  - ▣ To avoid feeling of being controlled
- Action guideline
  - ▣ Posting positive message
  - ▣ Replying others' message
  - ▣ Asking other's response
  - ▣ Showing others model behavior



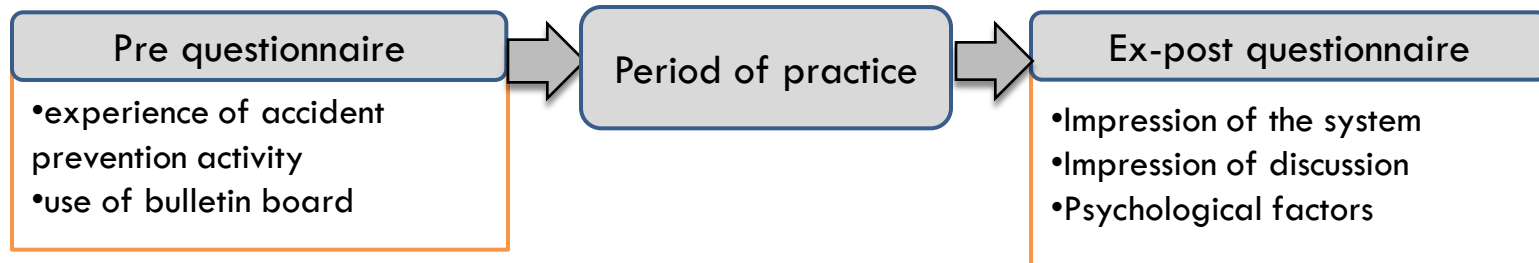
# Practice(field study)

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- Practice with real worker of nuclear power plants
- Purpose
  - ▣ To confirm the feasibility
  - ▣ To improve the method

- Flow

Jan/13/2009 ↔ Feb/6/2009



- Data collection

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

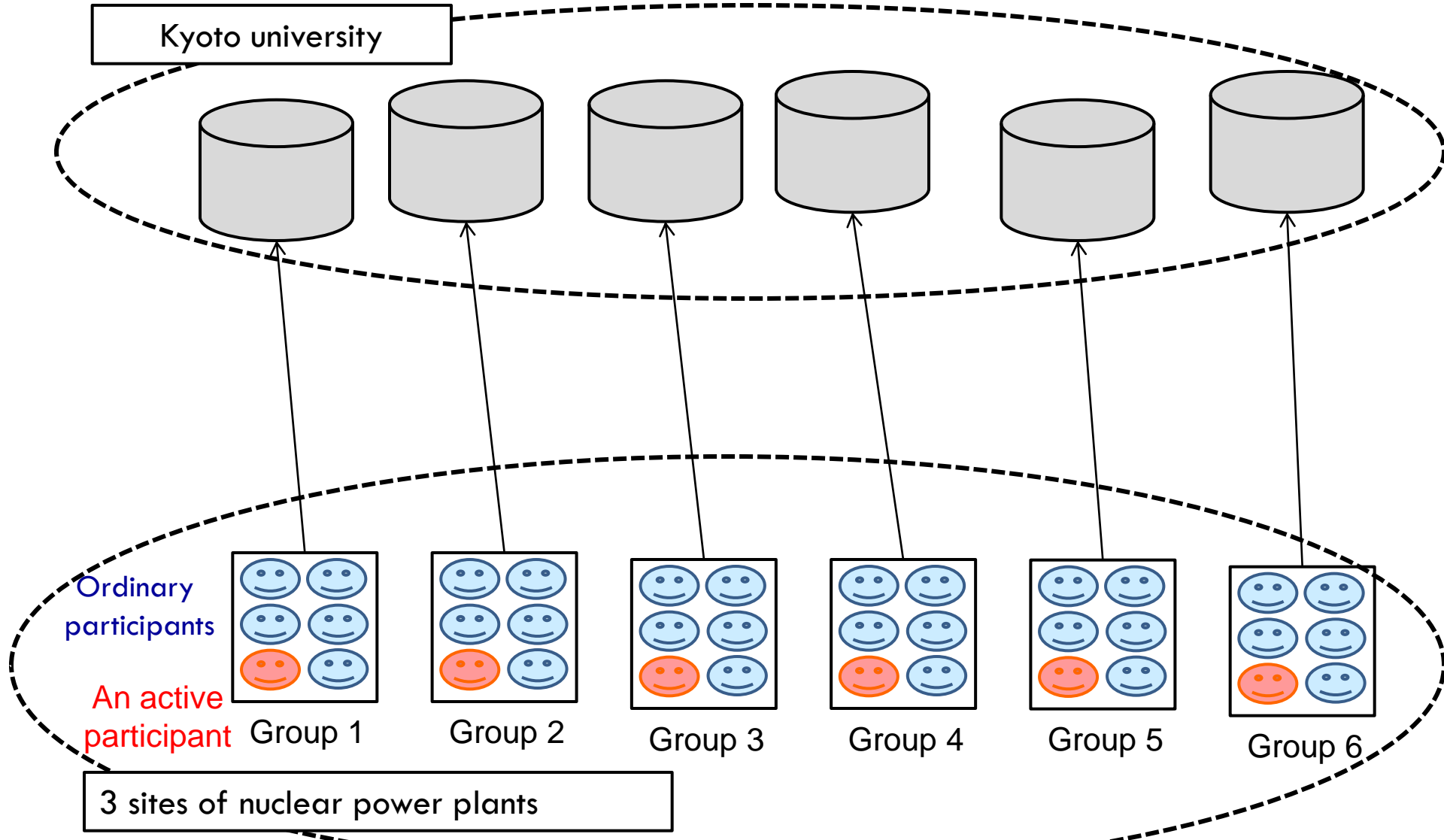
# Practice(field study)-2

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- Participant
  - ▣ 6 groups(total 36 participants)
    - One group
      - Five ordinary participants
        - field supervisors of three sites
        - the same section in each site
      - One active participant
    - Active participant
      - Researcher of human factors or expert field supervisor
- Request to ordinary participants
  - ▣ Discussion though the Internet
  - ▣ Submitting five cases of incident
- 23 incident cases were prepared in advance

# Practice overview

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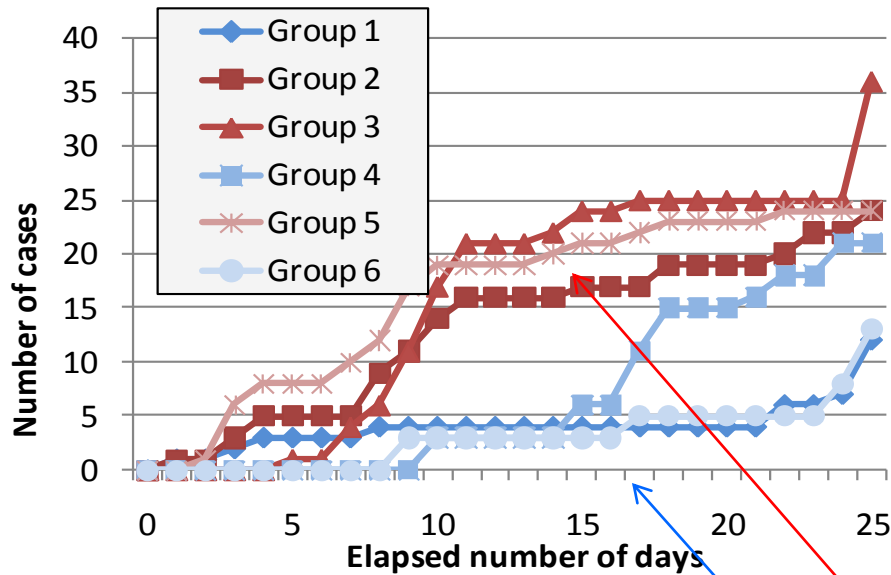


# Result

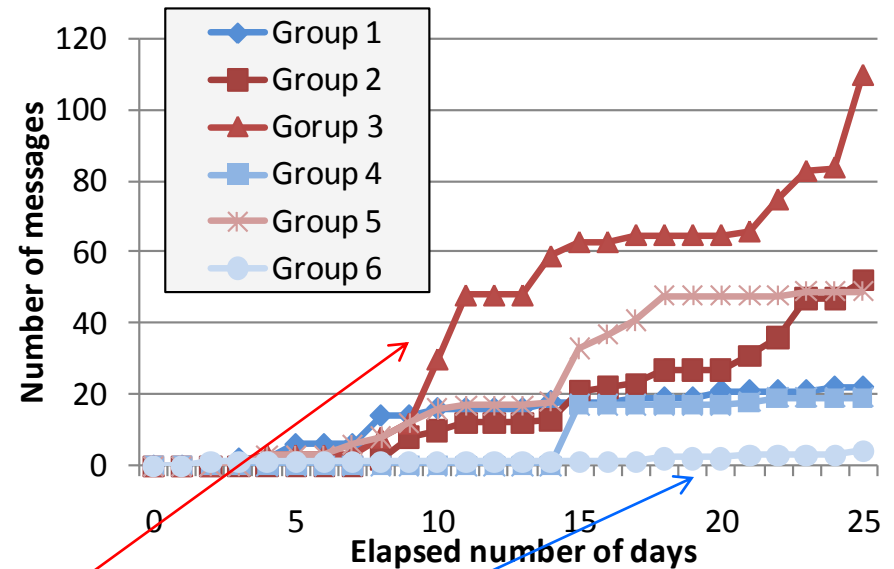
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## Comparison among groups

Accumulated total number of submitted cases.



Accumulated total number of messages.



Activated groups

● Group 2, Group 3, Group 5

Deactivated groups

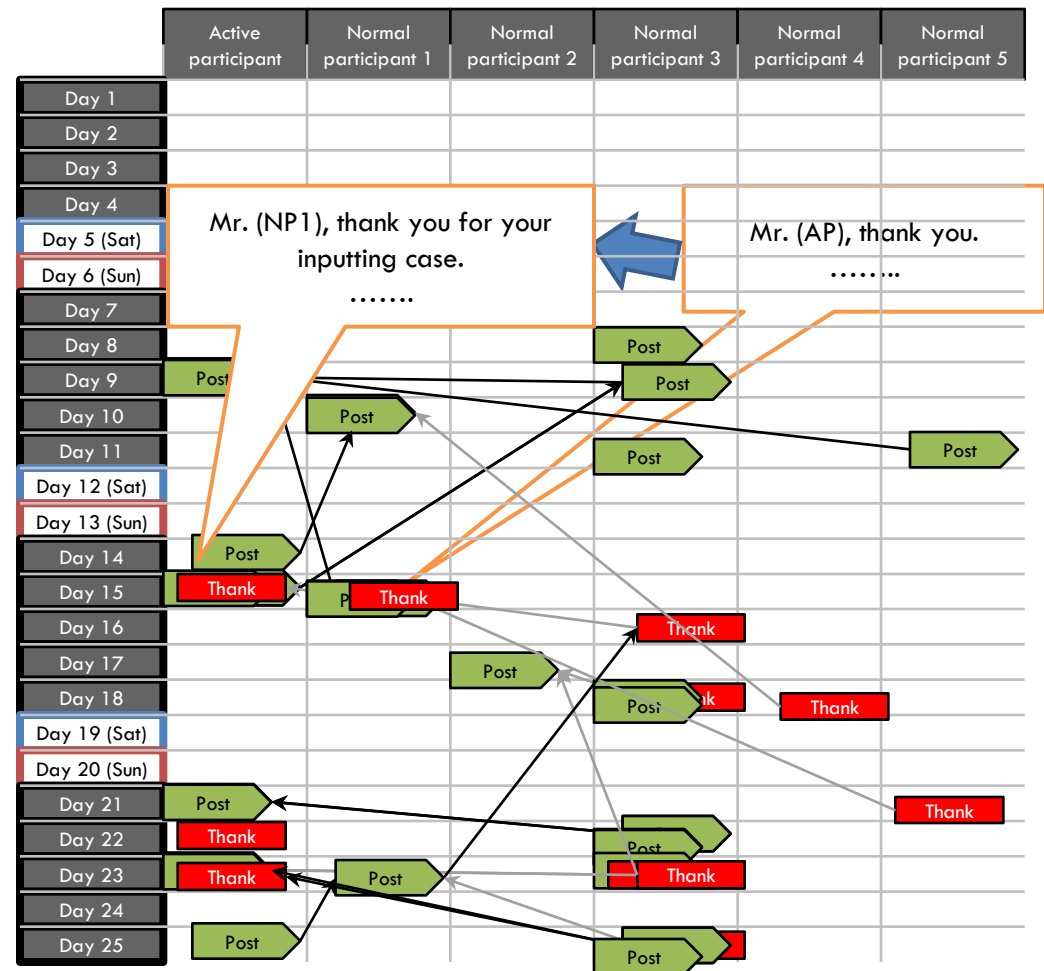
● Group 1, Group 4, Group 6

# Active participant's behavior

## A good example

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- Saying “Thank you” each other
  - ▣ spread to normal participants in group 2
- Succeeded in
  - ▣ Provision of continuing interaction pattern



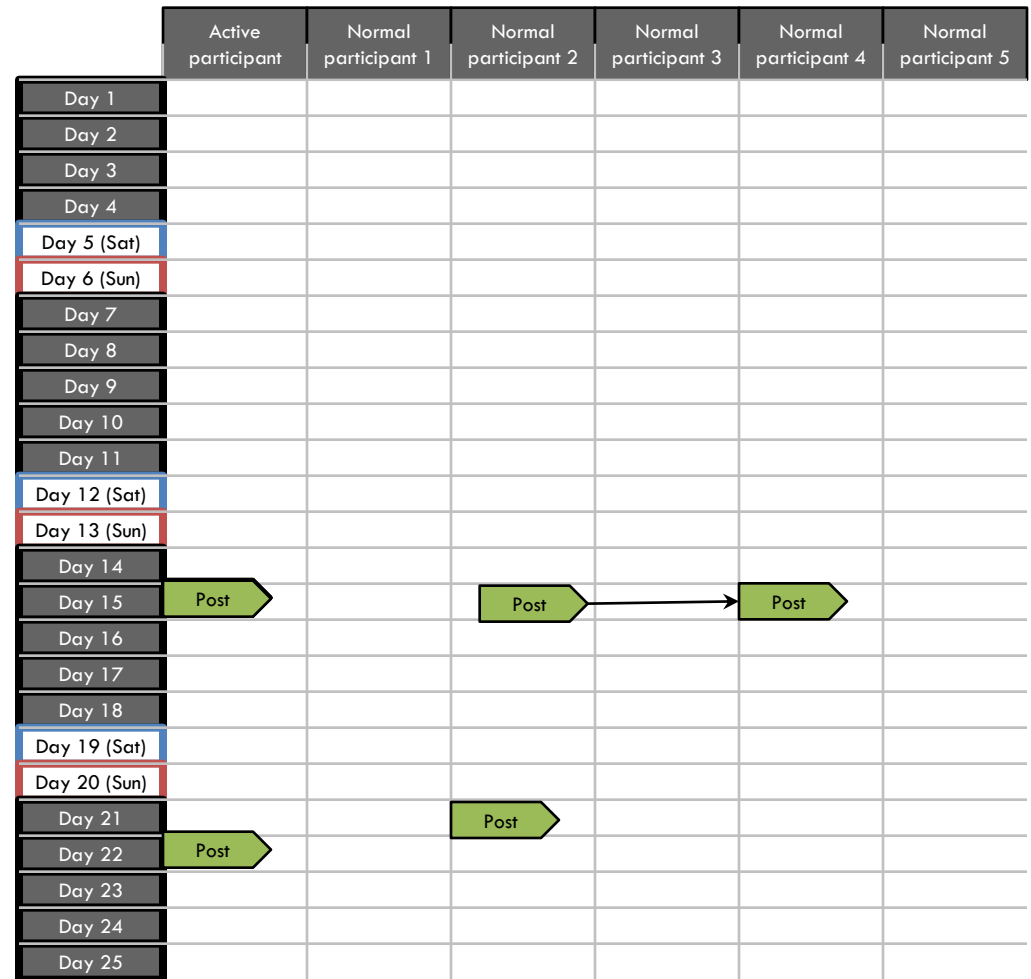
When and who posted messages in group 2

# Active participant's behavior

## A bad example

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- ❑ Failed to promote discussion
- ❑ Mismatching of topics
  - ▣ Active participant
    - Impression to cases
  - ▣ Ordinary participant
    - Concrete knowledge exchanging



When and who posted messages  
in group 4



# Participants' Cases versus Prepared Cases

## Comparison of Number of Messages

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Group	kind of case	total number of cases	no messages	one messages	two messages	three or more messages
Group1	prepared	23	15	4	3	1
	participant	12	8	2	1	1
Group2	prepared	23	18	5	0	0
	participant	27	10	3	8	6
Group3	prepared	23	3	5	11	4
	participant	41	18	3	6	14
Group4	prepared	23	9	13	1	0
	participant	26	24	0	2	0
Group5	prepared	23	20	0	2	1
	participant	24	11	4	2	7
Group6	prepared	23	22	1	0	0
	participant	15	10	5	0	0

- In prepared cases
  - No one has obligation of response

# Conclusion

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- Some methods succeeded in some groups.
  - ▣ Introducing active participant
  - ▣ ...
- Other functions need improvement
  - ▣ Active participant's guideline
  - ▣ Inputting case with RCA tree expression
- Implications
  - ▣ Participants should submit cases of incidents by themselves.
- Future
  - ▣ Reveal causes of difference of the result of groups.

**Thank you for your attention.**

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extra

# Discussion about incident and raising safety awareness

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- Discussion about incident
  - ▣ Opportunity of thinking about an example of dangers



- Learning from incidents
  - ▣ Dangerous factor
  - ▣ Dangerous situation
- Applying to their own work field



- Participants can feel danger's existence and safety behavior's importance

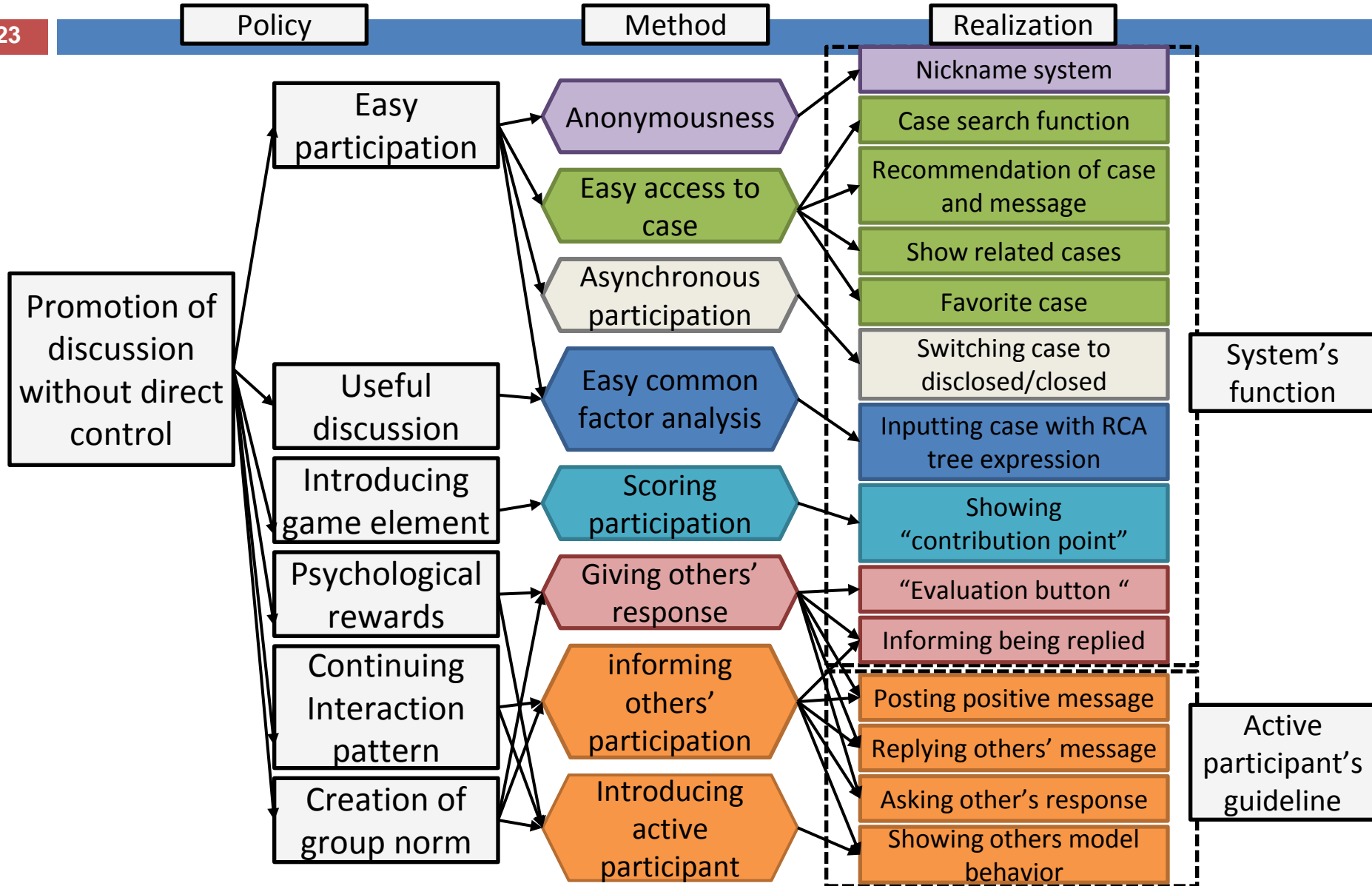


# Promotion without direct control is important

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- Promotion with direct control
  - (extrinsic motivation)
  - not continue
  - Example
    - Money as reward
    - order by their boss
  
- Promotion without direct control
  - (intrinsic motivation)
    - Feeling of autonomy
  - continue(Gange and Deci 2005)
  - Example
    - Interest to target activity
    - Importance of target activity

# Full version of the proposed method



# The Discussion System Case Searching page

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- Searching cases of incidents by keywords or categories

Keyword entry field



ハットヒヤリ事例共有システム 事例共有ページ

事例共有ページ | マイページ | 新規事例を登録 | 本事例の掲示板 | 本事例の件数情報 | 保存する | パスワード変更 | 操作方法

閲覧推薦事例  
未閲覧の推薦事例はありません。

公開メッセージ  
事例1: [僕もよく寝坊するので、気をつけたいと思いました。しかし、目覚まし時計を増やしても...](#)

表示事例絞り込みメニュー  
このキーワード・条件で絞り込み

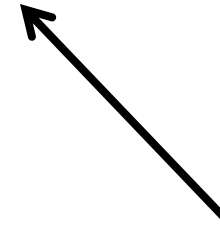
キーワードが複数ある場合は、「不注意 and 転落」の様にorまたはandで区切って入力してください。

表示する事例の範囲  
 お気に入り事例のみ  自分の非公開事例を含める  
 作業区分で事例を絞る  作業段階で事例を絞る

キーワードを検索する項目  
全てチェック | 全チェック解除  
 件名  入力者  掲示板  
 出来事  要因  対策  
 作業概要と発生状況

登録日:    
最終更新日:

番号	件名 (検索対象)	登録日 入力者	最終更新日	被閲覧回数	掲示板投稿数
<input type="checkbox"/> お気に入り 複製	1 <a href="#">修士論文の締め切りを遅過ぎ</a>	2009-6-21 Albert	2009-6-21	0	2 <a href="#">新規投稿有</a>
<input type="checkbox"/> お気に入り 複製	2 <a href="#">寝不足で特急</a>	2009-6-21 Albert	2009-6-21	1	0 <a href="#">(掲示板へ)</a>

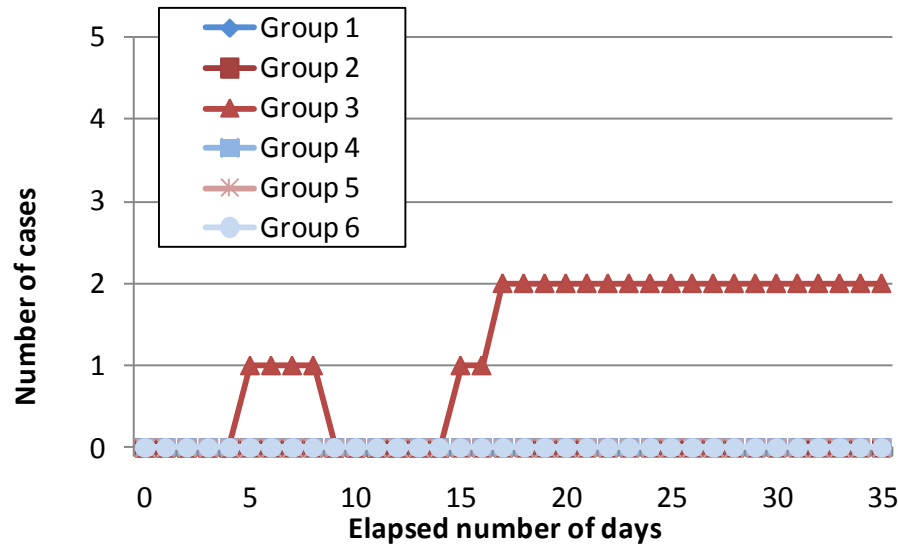


List of cases of incidents  
and links to cases or bulletin boards

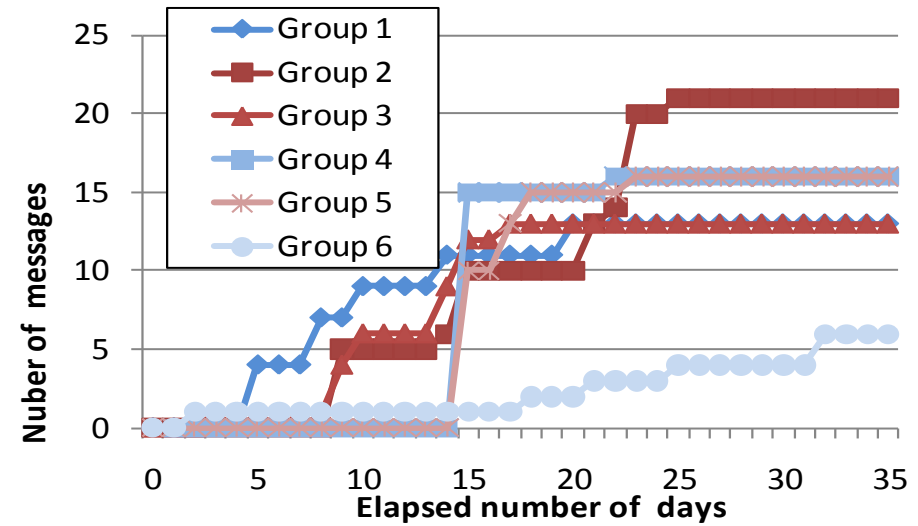


# Each groups' active participants

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Accumulated total number of submitted cases of active participants

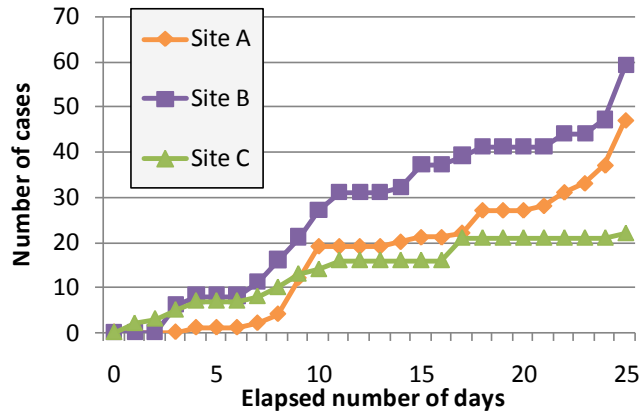


Accumulated total number of messages of active participants.

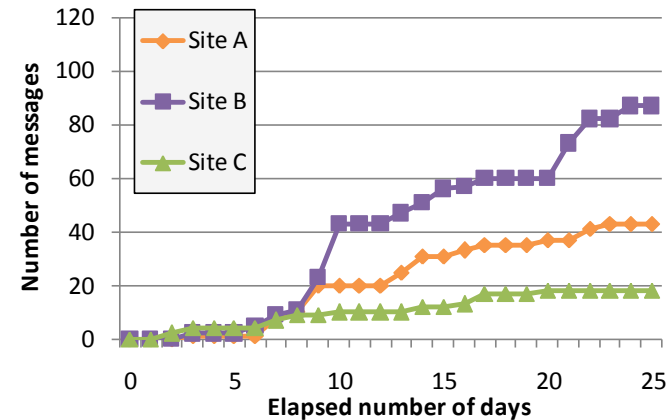
- No active participants submitted any cases except for group 3
- all participants posted 13 or more messages except for group 1

# Comparison among 3 sites

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Accumulated total number of submitted cases of each site.



Accumulated total number of messages in bulletin boards of each site.

- Site A is the oldest site in this company.
  - ▣ Good organizational culture
- Site B finished regular check of plants at day 9.

# Ex-post questionnaire

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- Impressions of the practice