

D-Case Steps: New Steps for Writing Assurance Cases

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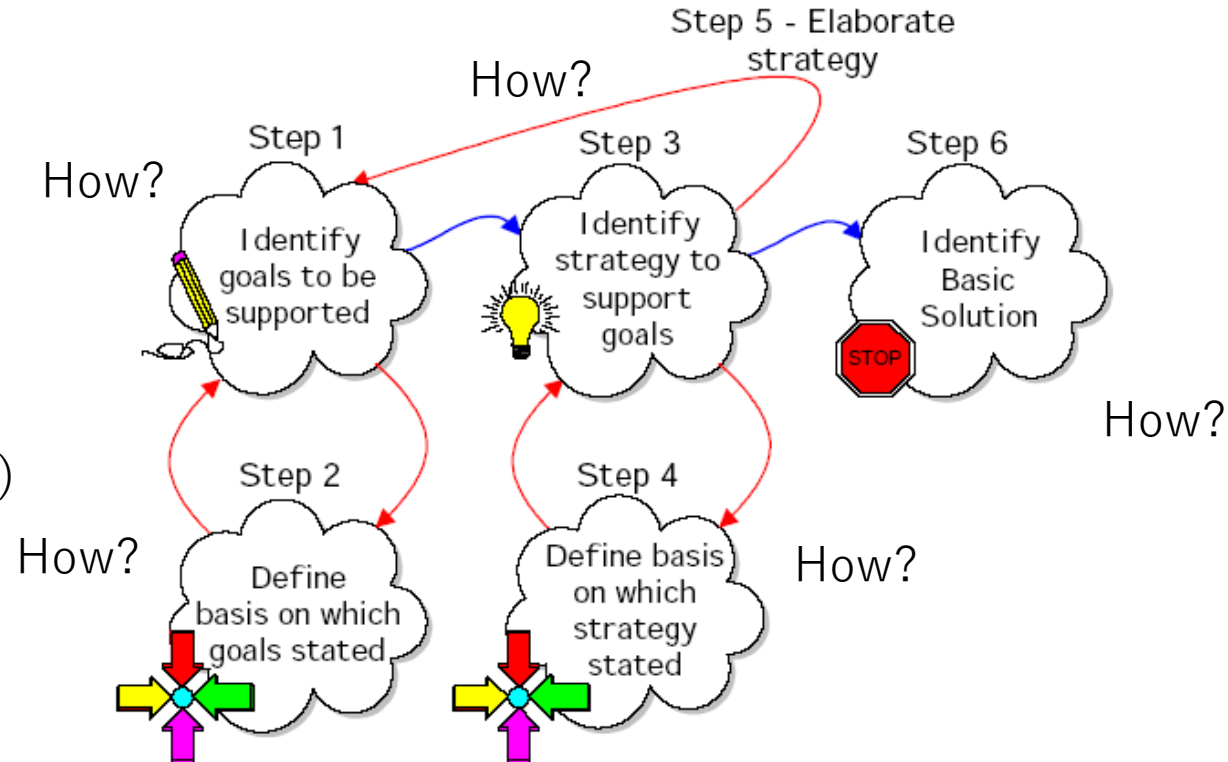
Guidebooks for Writing Assurance Cases

- Six Steps Method (GSN Community Standard Ver. 1,2)

Arguments tend to be
divergence

Goal decomposition
is difficult
...

(from our experiences)



From GSN community Ver.2

Figure 35: Six-Step Process for Developing Goal Structure

Guidebooks for Writing Assurance Cases

- Other guidebooks require safety analysis and domain knowledge
 - Argument Construction, and Safety Analysis and Domain Knowledge should be separately studied
- Our Idea:
 - Focusing on Argument Construction
 - Focusing on Stakeholders
 - Limit the contents only for the stakeholders
 - Goal decomposition is determined by preference of the stakeholders

Running Example: Smart Room Viewing System

- Unattended viewing by advance reservation. Usually (in Japan) when renting a room, first the customer views the room accompanied with a real estate employee. However, using smart room viewing, the customer can view the room without one of the employees.

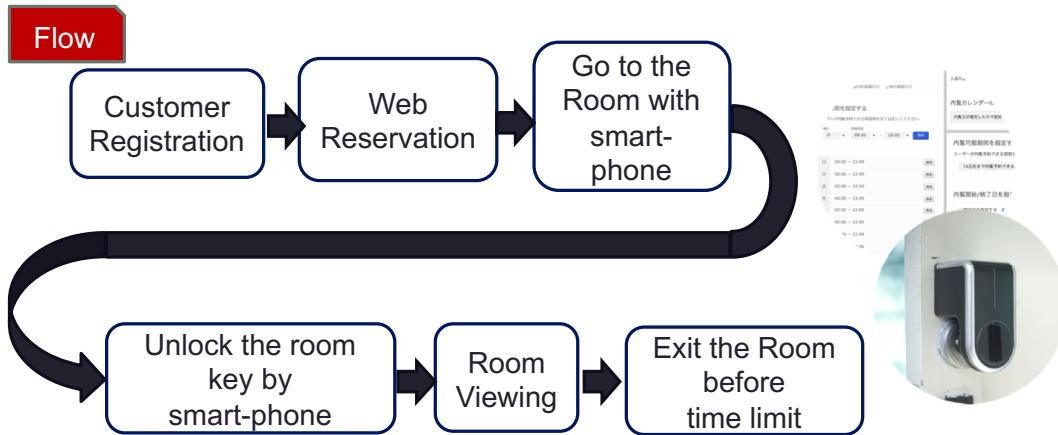
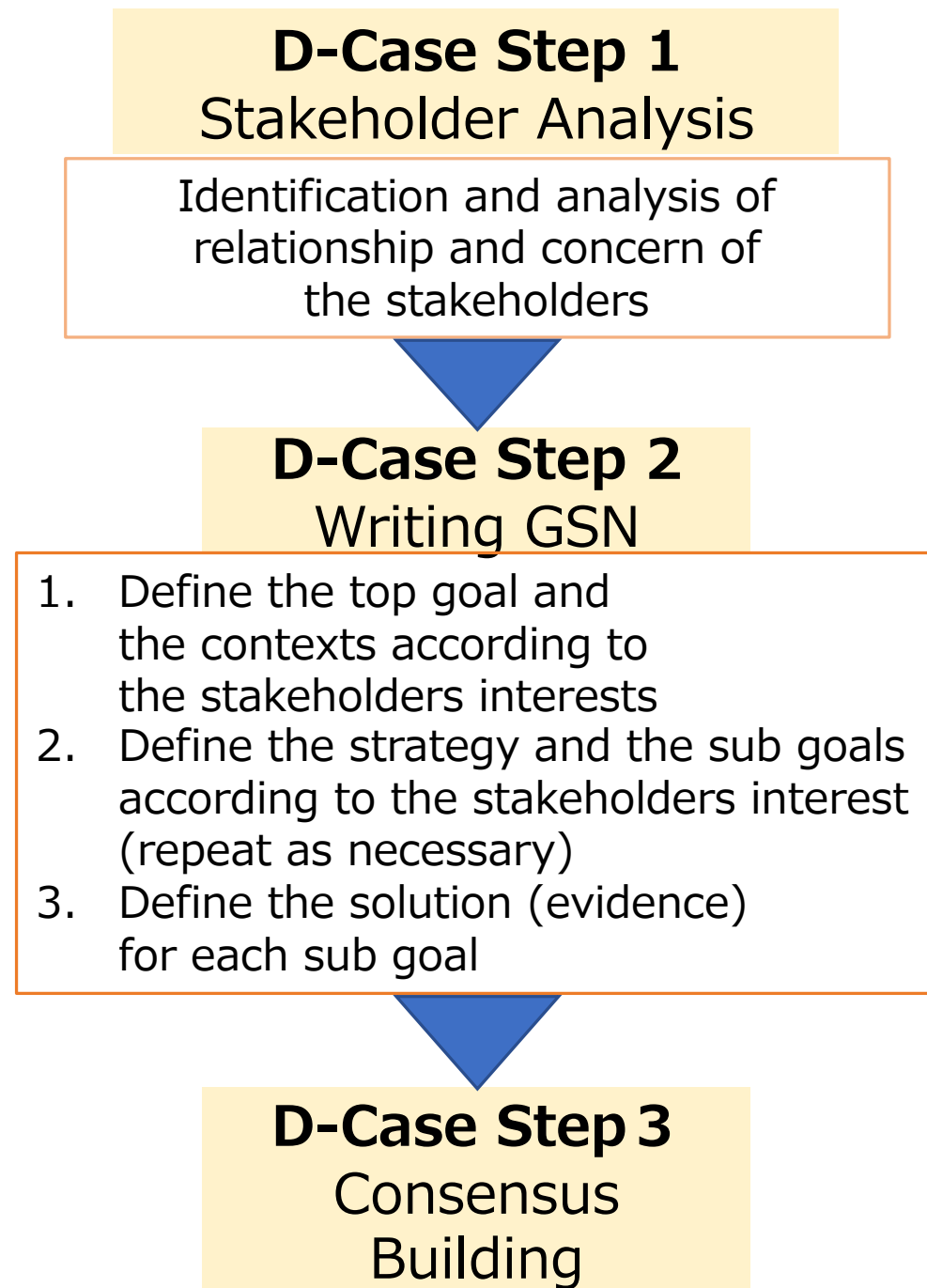


Fig. 1. Flow of Smart Room Viewing System

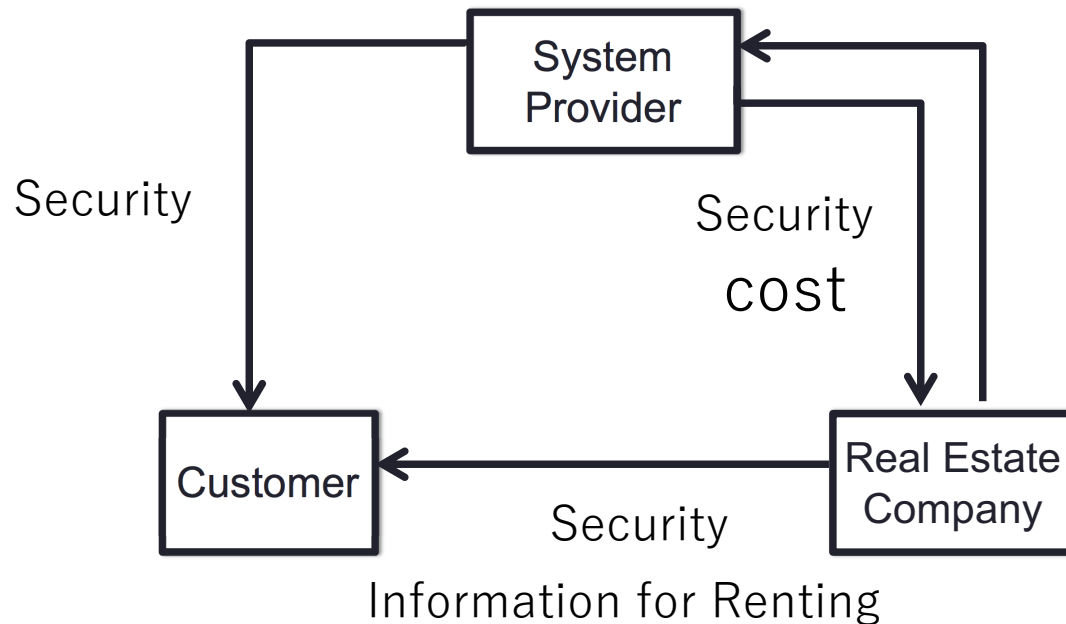
- Unlocking the room key is done by user authentication using customer's smart-phone.
- Inside the room, the customer can check information of the room by a smart tablet.
- The customer can freely view the room within the time limits.
- The customer receives a notation of 5 minutes before the end by the tablet.
- The room is secured by surveillance cameras when customer is viewing the room.
- When finishing room viewing, the customer check that the room key is locked.

D-Case Steps



D-Case Step 1 Stakeholder Analysis

- Identify Stakeholders
- Identify their relationships and concerns



Many works on Stakeholder analysis in software engineering. We should borrow them

Fig. 3. An Example of Stakeholder Analysis

D-Case Step 2

- Set top goal and contexts according to the stakeholders concerns

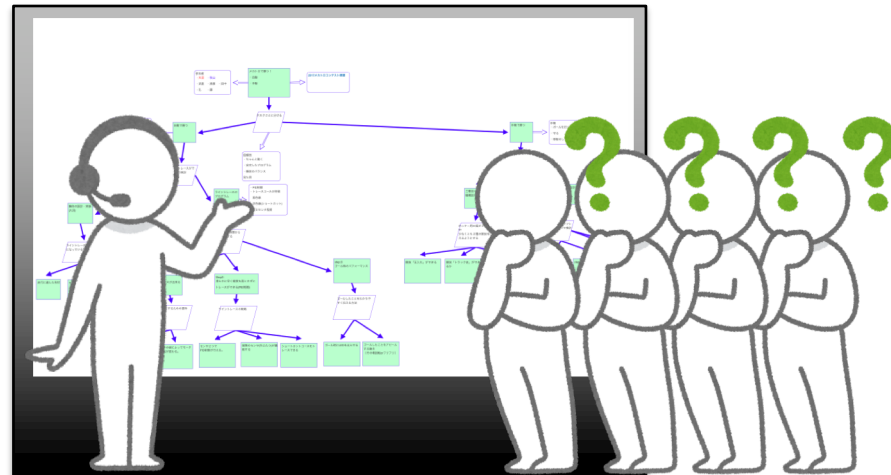
- The customer can obtain necessary information for renting the room. This claim is about information quality of the smart room viewing system.
- Smart room viewing system is acceptably secure. This claim is assured in possibly three cases: by the system developer to the real estate company, by the system developer to the customer, and by the real estate company to the customer.
- Smart room viewing system is cost-effective. This claim is assured by the system developer to the real-estate company.

- Set strategies according to stakeholders concerns, and divide the goal into sub goals (recursive)
- Set evidence as final leaves

Essentially the same as
Six steps method except
“according to the stakeholders concerns”

D-Case Step 3 Consensus Building

- Number of participants: within 5
- Using a projector



GSN Evaluation Criteria

- Many existing works such as confidence, probabilistic approach, ...
- Evaluation Criteria
 - Context Validity. Context nodes plays crucial rules for GSN, and contexts nodes should be linked to appropriate goals or strategies to describe context information of them. The importance of context is discussed in several previous work, such as [10] and [7].
 - Logicality. The structure of GSN represents a logical argument that the claim in the top goal holds. Therefore it is important to check the logicality of the GSN.
 - Relevance of Scale. The stakeholders of a system have their own limited time and knowledge about the system. Thus it is important to limit the scale of the GSN diagram so that the stakeholders can read and understand it. As far as we know, this criteria has not been discussed in the literature.

Criteria should be understandable to ordinary people

In GSN Community Standard v2
Clarity,
Comprehensively,
Veracity

D-Case Workshops

- Assurance Cases Workshop in Japan
 - 1~3 times for a year since 2012. 10~31 participants, mostly from Japanese Industries
- We used D-Case Steps for Jan. and March 2018 Workshops

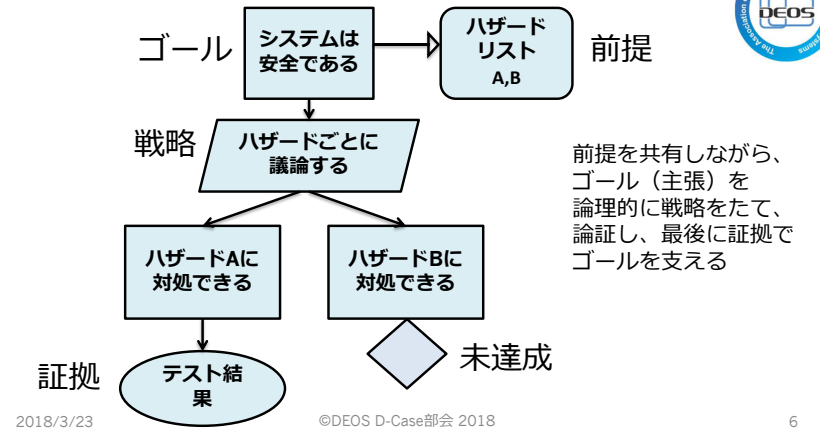


Using D-Case Communicator,
An Web Based GSN tool
(Assure 2017)

Workshop Contents

1. Introduction of GSN and simple exercises for GSN syntax.
2. Introduction of D-Case steps.
3. Exercises for D-Case steps by group discussion.

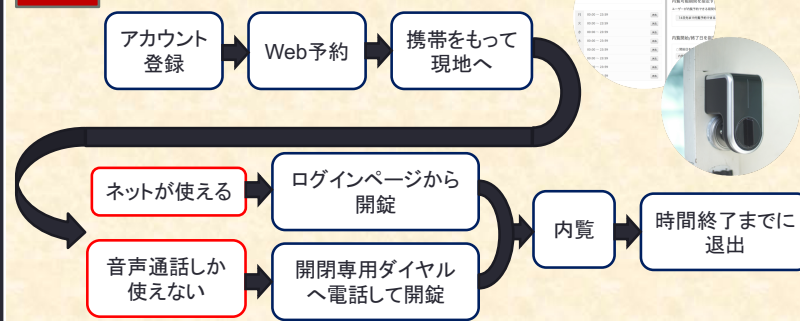
GSNの簡単な例



スマート内覧とは

- ユーザーの携帯電話を利用して
セルフ(自分だけ)で内覧できるサービス

流れ

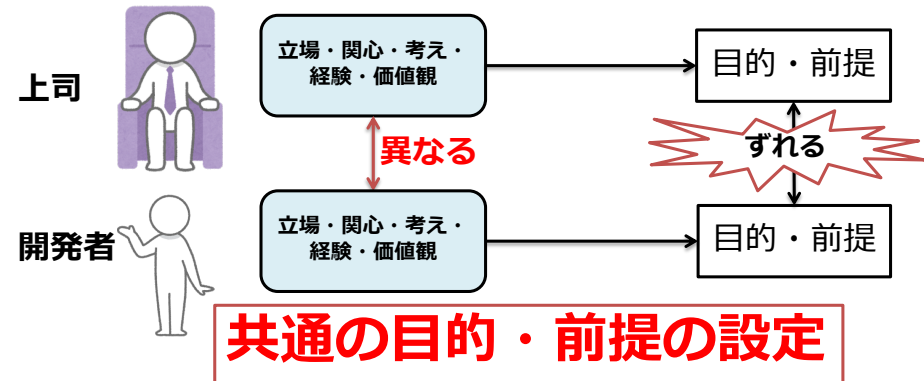


Step1:ステークホルダの設定

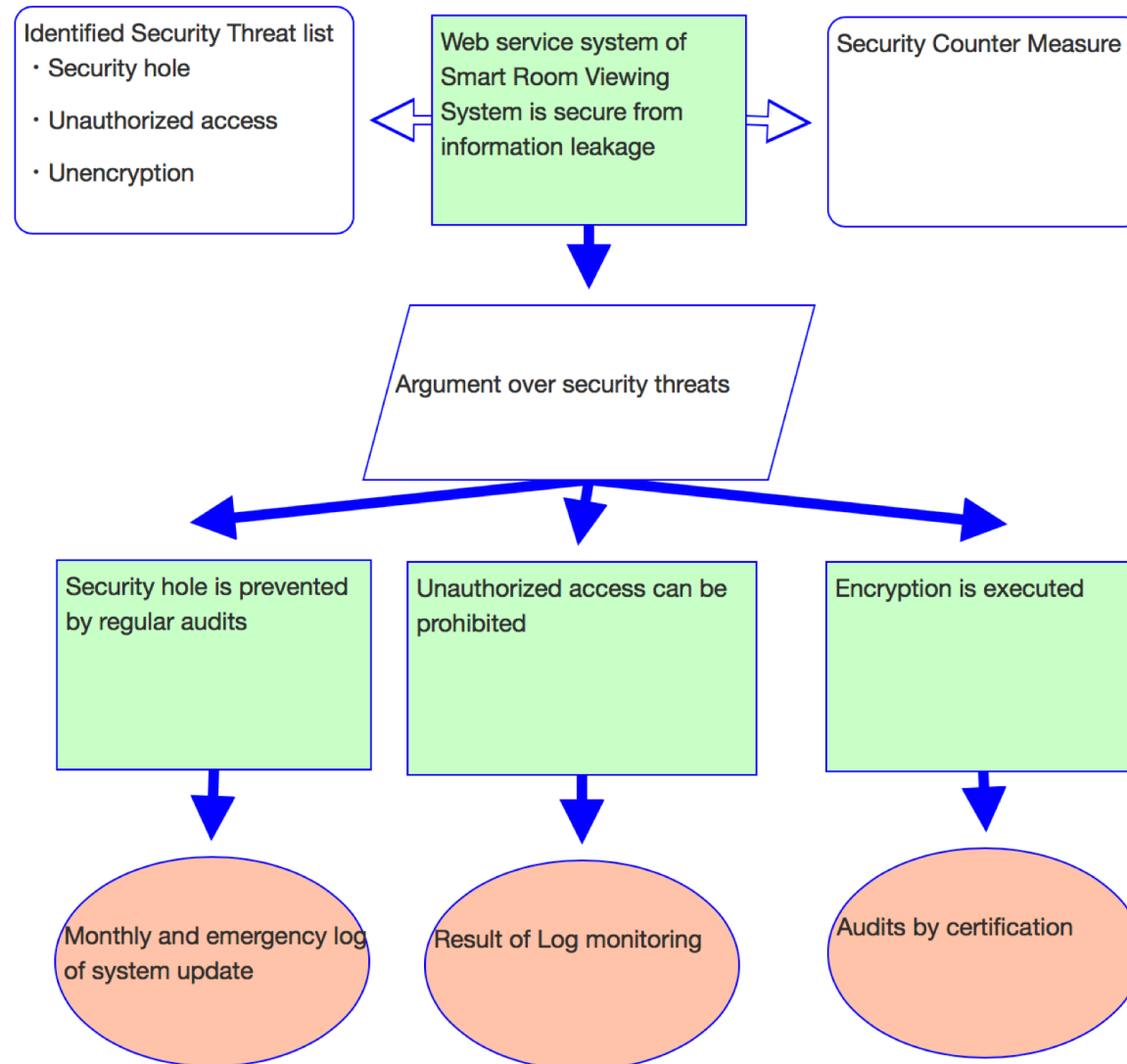
合意内容の明確化を図る

D-Caseステップとは？

- 3ステップに分割しD-Case作成
- ① ステークホルダの設定
 - ② D-Caseの記述
 - ③ 合意形成の実施



GSN Written by Participant



System Provider ->
Real Estate Company

Workshop Evaluation

Table 1. Result of Questionaries

1 is lower
4 is higher

	1	2	3	4	average
Content of WS	0	1	7	10	3.5
Understandability	0	1	9	8	3.39
Easy to write Top Goal?	0	1	13	4	3.17
Easy to write Contexts?	0	9	7	2	2.61
Easy to write Strategies?	4	1	9	4	2.72
Easy to write Sub Goals?	1	4	10	3	2.83
Easy to write Evidence?	0	6	7	5	2.94
Good for Consensus Building?	0	4	7	7	3.17
Good for Practical Use?	1	2	9	6	3.11

Conclusion

- D-Case Steps for Writing Assurance Cases (GSN)
 - Focusing on Stakeholders
- Workshops for Japanese industries
 - Difference with other methods such as FTA, FMEA, Mind Map, etc,...
 - Difficulties: Setting goals, context, strategy, evidence