# Systems Approach we talk about today

- **Value Graph (upper half)**
  - purpose and alternative viewpoint
  - higher purposes and alternative ideas
- **Causal Loop Diagram**
  - cause-and-effect viewpoint
  - causes and effects
- **Customer Value Chain Analysis (CVCA)**
  - value chain viewpoint
  - stakeholders and their values
- **Function and Physical Architecture**
  - function and physical viewpoints
  - functions and physical structures

# Value Graph

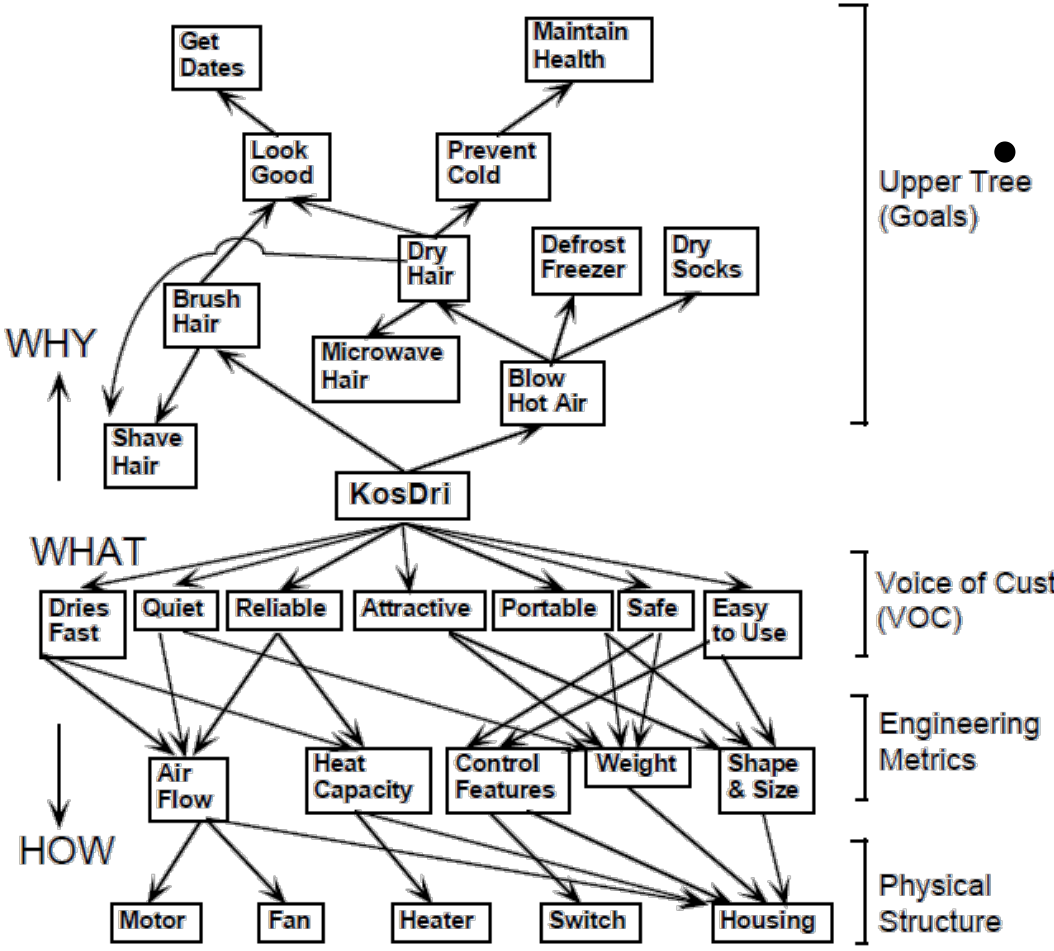



**Figure 2.1.3** The Value Graph for KosDri

- **Value Graph (upper half)**
  - purpose and alternative viewpoint
  - higher purposes and alternative ideas

Source: Ishii, K and Kmenta, S. (2003) '2.1 Value Engineering (Value Identification and Functional Analysis)', ME317df*M*: Product Design Value Engineering, Reader, Stanford University.

Note: The **what** and **how** questions lead to another powerful technique called *Quality Function Deployment*. We will not go into the details of QFD here, but use of the Value Graph will prepare us for the inputs and factors addressed in QFD.

# Value Graph

- Value Engineering (VE) is a technique that allows design teams to systematically review their objectives and the proposed design at various stages of product development.(2.1 Value Engineering (Value Identification and Functional Analysis), 2003)

- Technique developed based on *Functional Structure Analysis* from *Value Engineering*.
  - Associates values, functions, and concept
  - Visualize the interrelationship
- Originally used for product and service design

# Thinking beyond your first idea

- The first design can haunt you.
  - Often holds on to the first design developed in early stage.
  - Cannot discard the first design even when it may be necessary.
- Consider the higher level purpose ("meta thinking") and set your mind free for better design option.
  - Ask your self "why do we need this?" question to clarify the higher level purposes.
- Identify different levels of purposes to help generate alternative creative design options.
  - By thinking how the purpose could be satisfied.

# Identifying higher level purposes: Value Ladder Representation

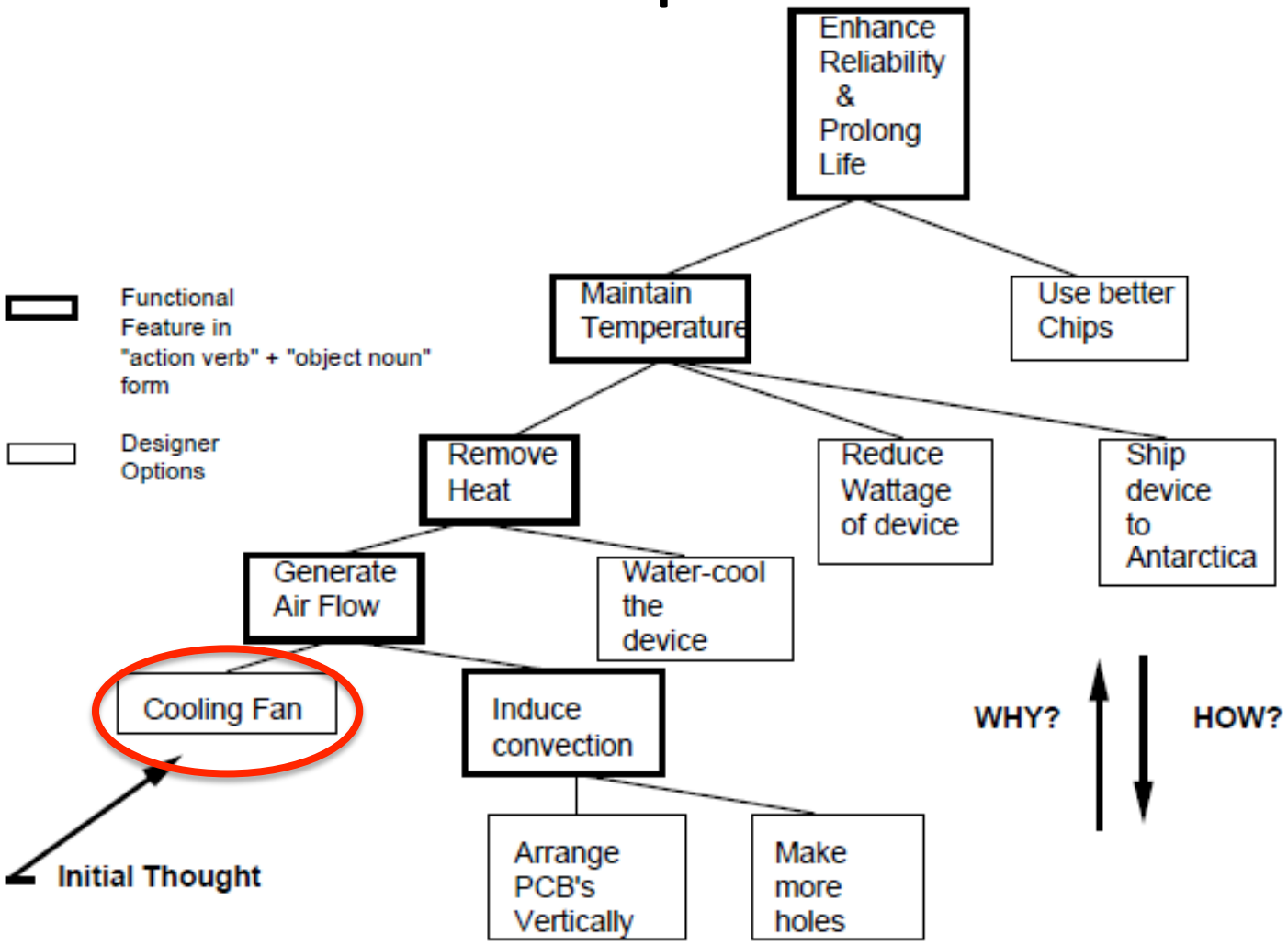
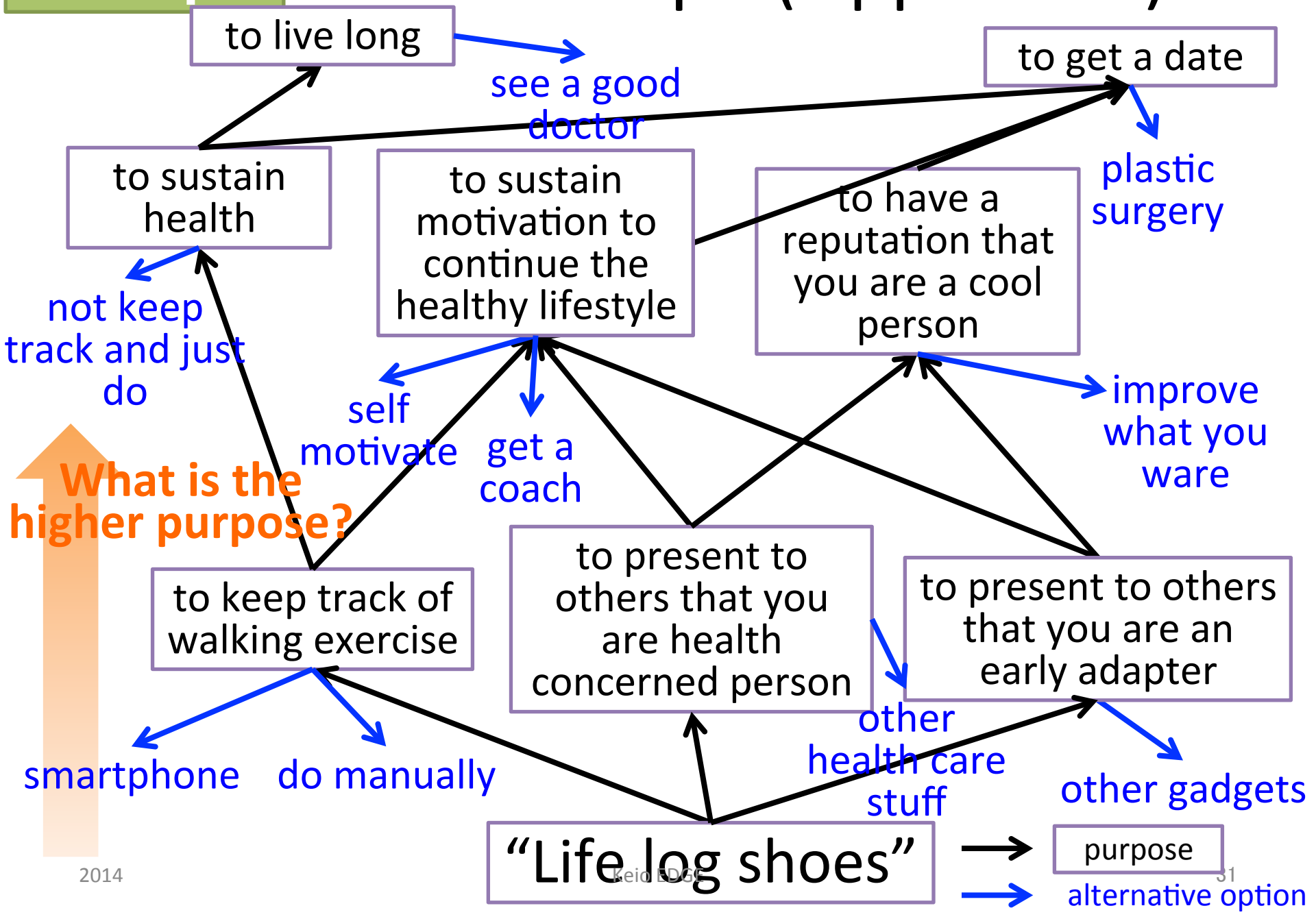


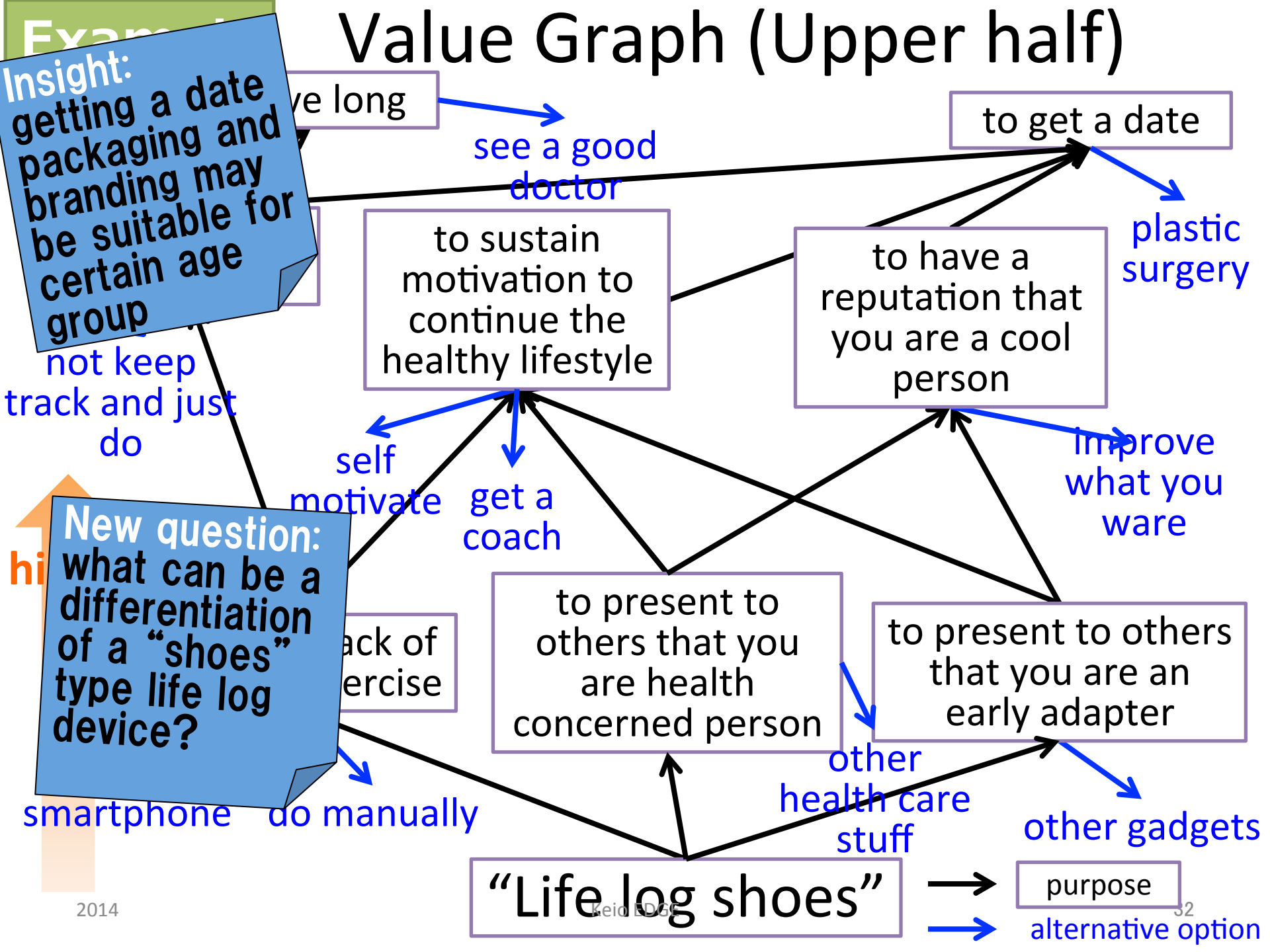

**Figure 2.1.2** Identification of Product Values and Goals
(Based on Discussion Held at Apple Corporation, Cupertino, CA, March 1987)

Source: Ishii, K and Kmenta, S. (2003) '2.1 Value Engineering (Value Identification and Functional Analysis)', ME317df*M*: Product Design Value Engineering, Reader, Stanford University.

# Example Value Graph (Upper half)



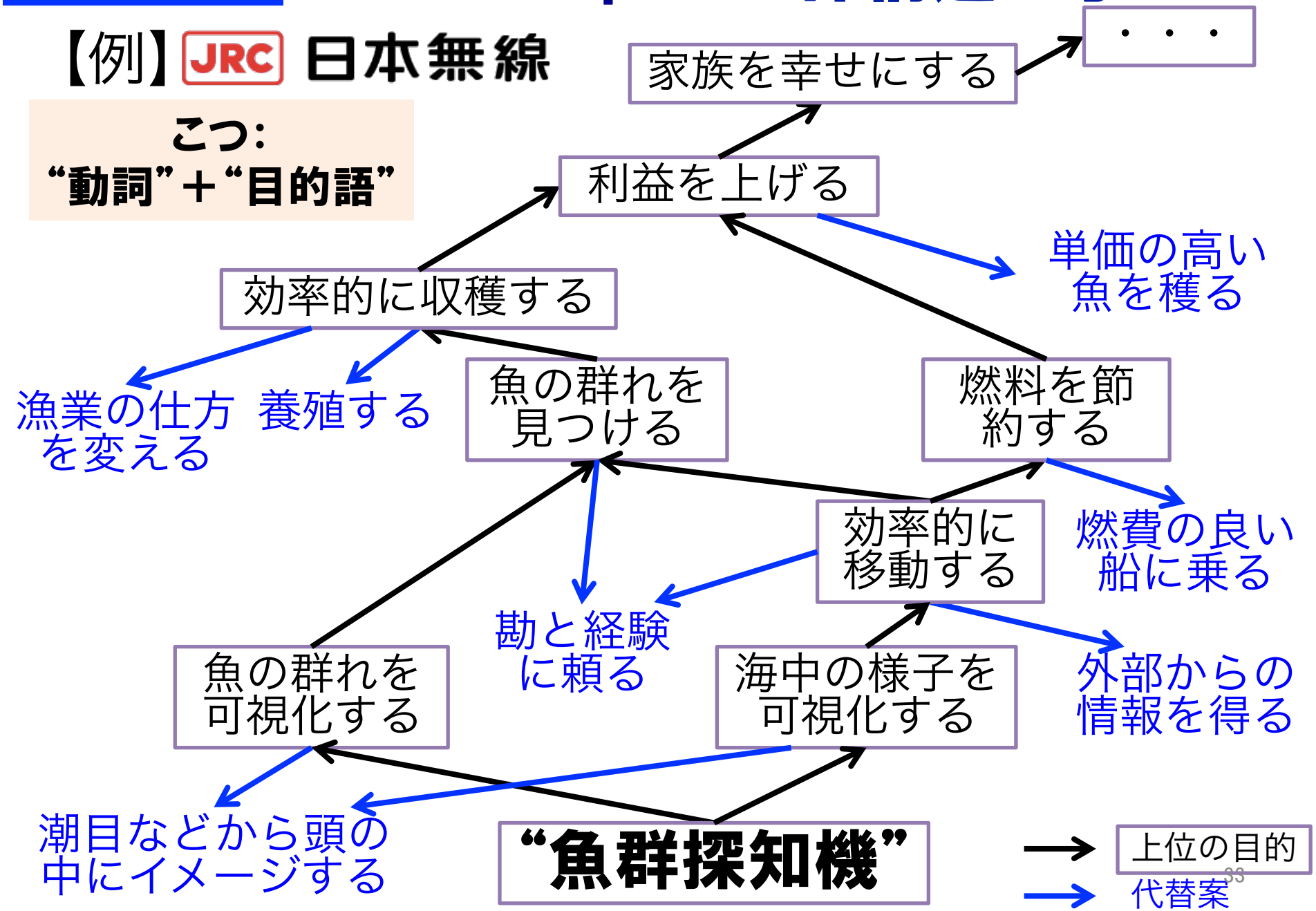
# Value Graph (Upper half)



# Example Value Graphの上部構造を考える

【例】JRC 日本無線

**こつ:**
**“動詞”＋“目的語”**



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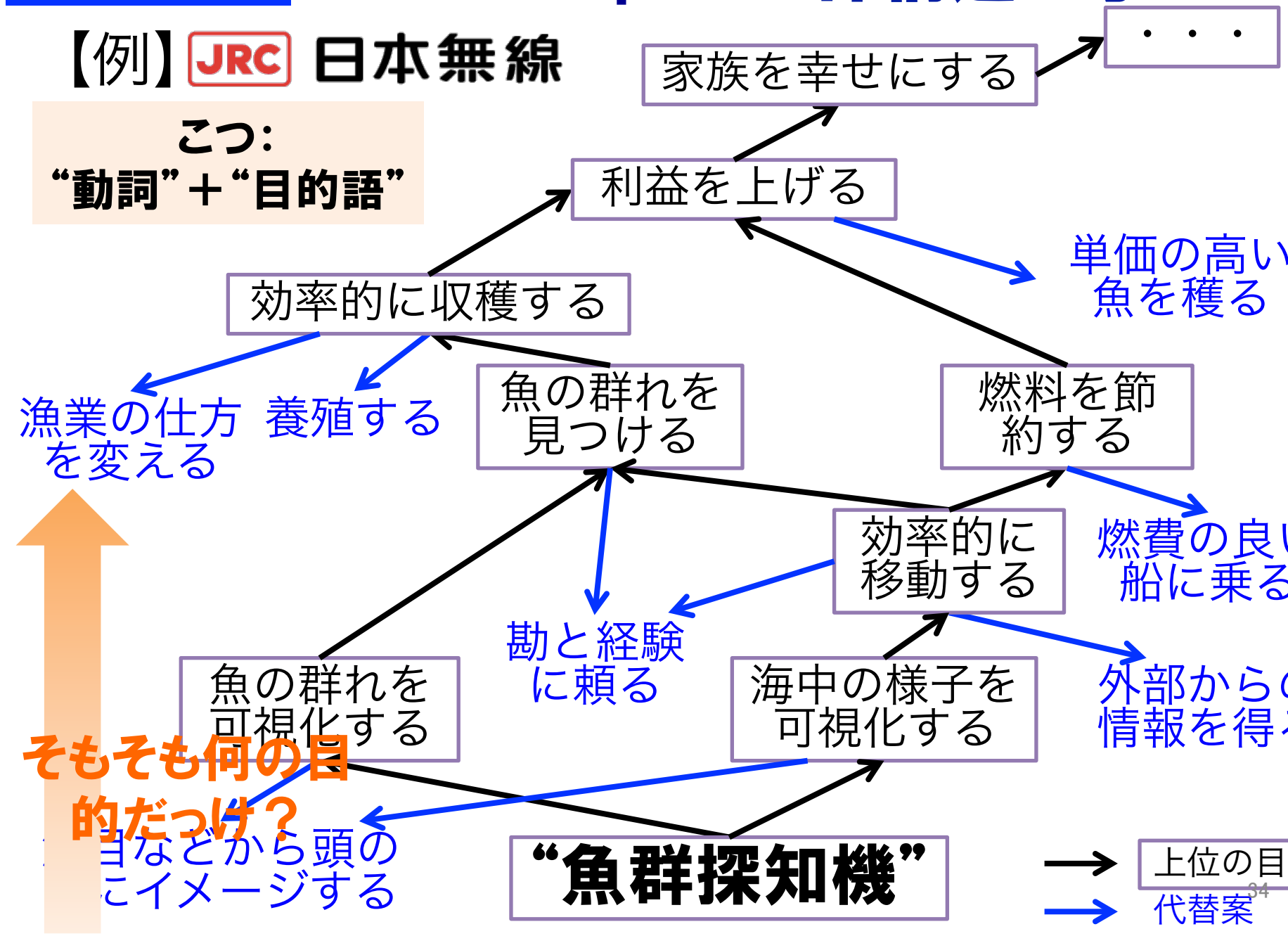

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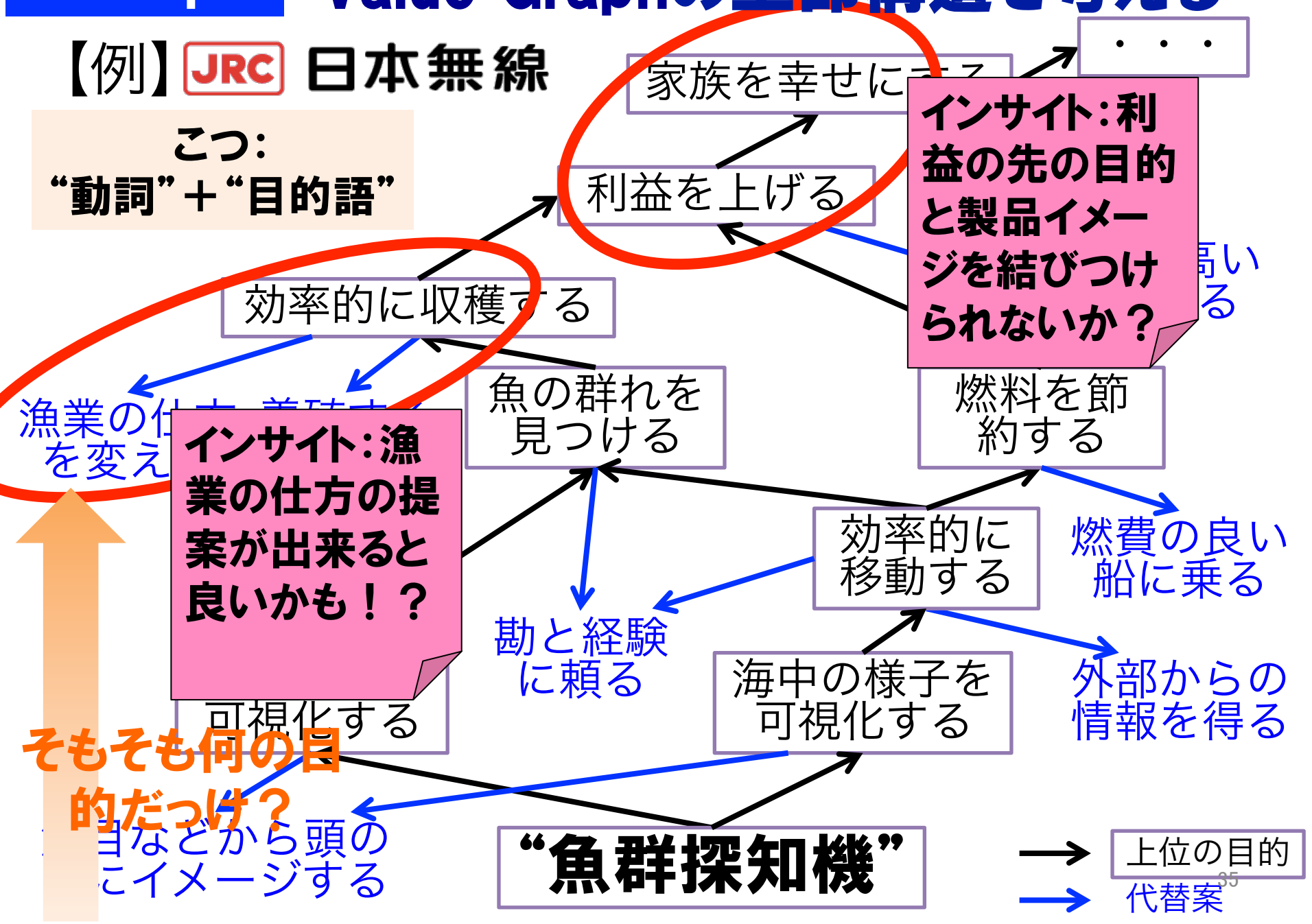
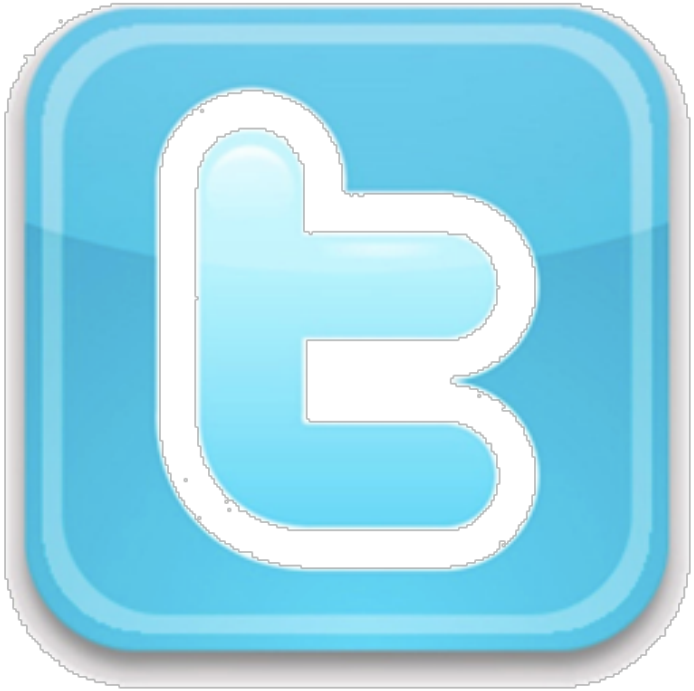


Practice

# Value Graph (Upper Half)Creation Practice



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Exercise

# Value Graph Exercise 1

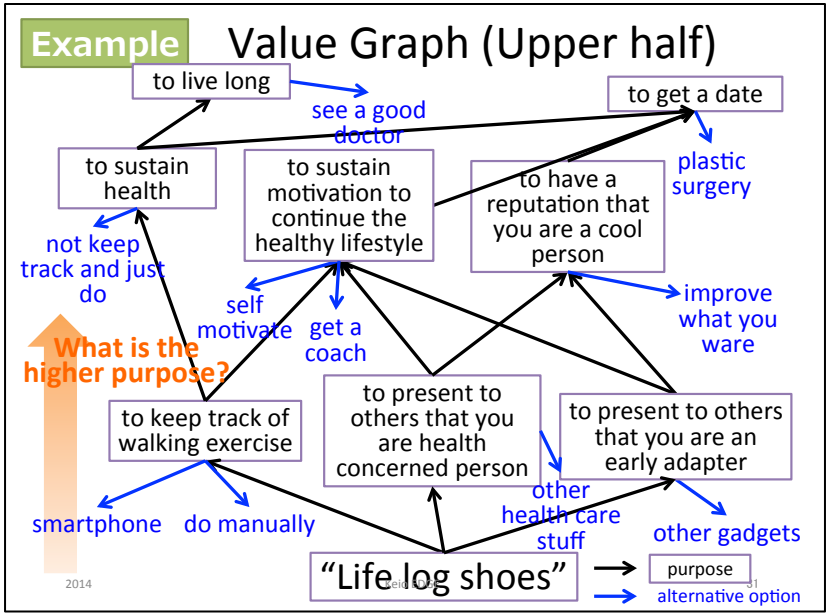
- **Discuss and create a Value Graph (Upper Half)** from one of your concepts or ideas. (*If you don't have one than you can do "wearable life log device".)

☐ Whose purpose?

☐ Alternate purposes?

☐ Alternative options?

☐ More abstract purposes?

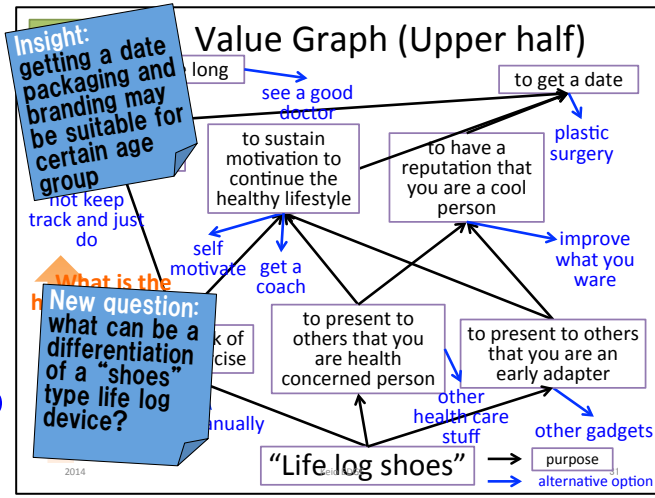



**Structurizing and visualizing your purposes and alternative options to expand the solution space**

Exercise

# Value Graph Exercise 2

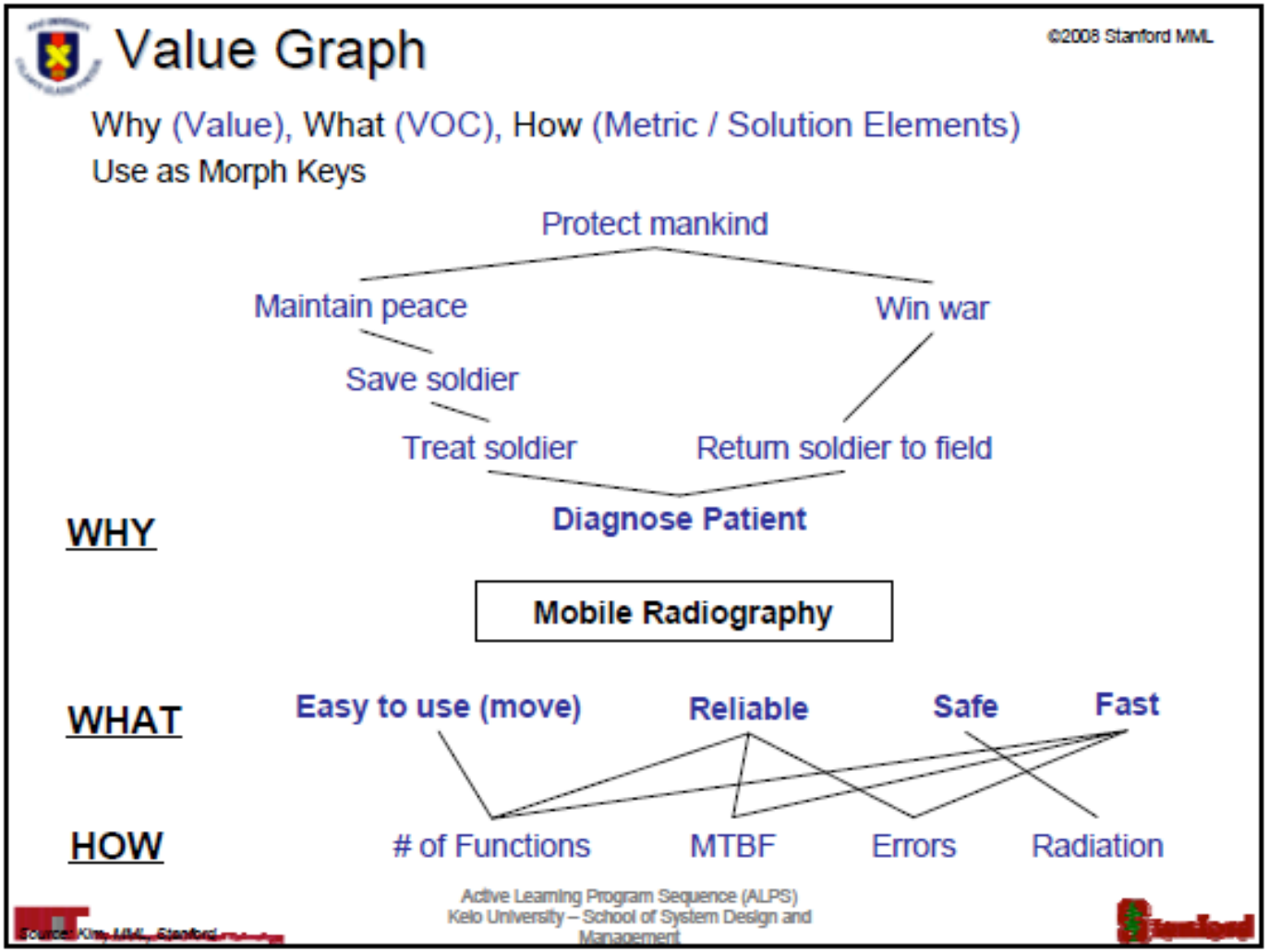
- Discuss about your Value Graph (Upper Half) session. Both process and output.
- Jot down **interesting finding** and **new questions found** during the discussion. They may be important insights.




- ☐ Unnoticed upper purpose?
- ☐ Unnoticed alternative options?
- ☐ Interesting propose design?
- ☐ Interesting competition/collaboration?
- ☐ Chance to re-define your concept?

**Look for insights that helps you to refine/ update/redefine your concept or idea.**

# Value Graph Ex.: Mobile Radiography




Source: Kim, S (2008) Using Scenarios, Slides for Keio ALPS, May 2008, p.12

# Value Graph Related Reading Materials

- Ishii, Kosuke, and S. Kmenta. 2.1 Value Engineering (Value Identification and Functional Analysis). ME317 dfM: Product Definition Value Engineering, 2003.
- Kim, Sun K., Kosuke Ishii, and Kurt Beiter. "Scenario-Based Design for Amorphous Systems". Proceedings of ASME International Mechanical Engineering Congress and Exposition. 2008.