Systems Approaches we talk about today

- **Function and Physical Architecture**
  - function and physical viewpoints
  - functions and physical structures
- **Value Graph (upper half)**
  - purpose and alternative viewpoint
  - higher purposes/value 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

Value Graph

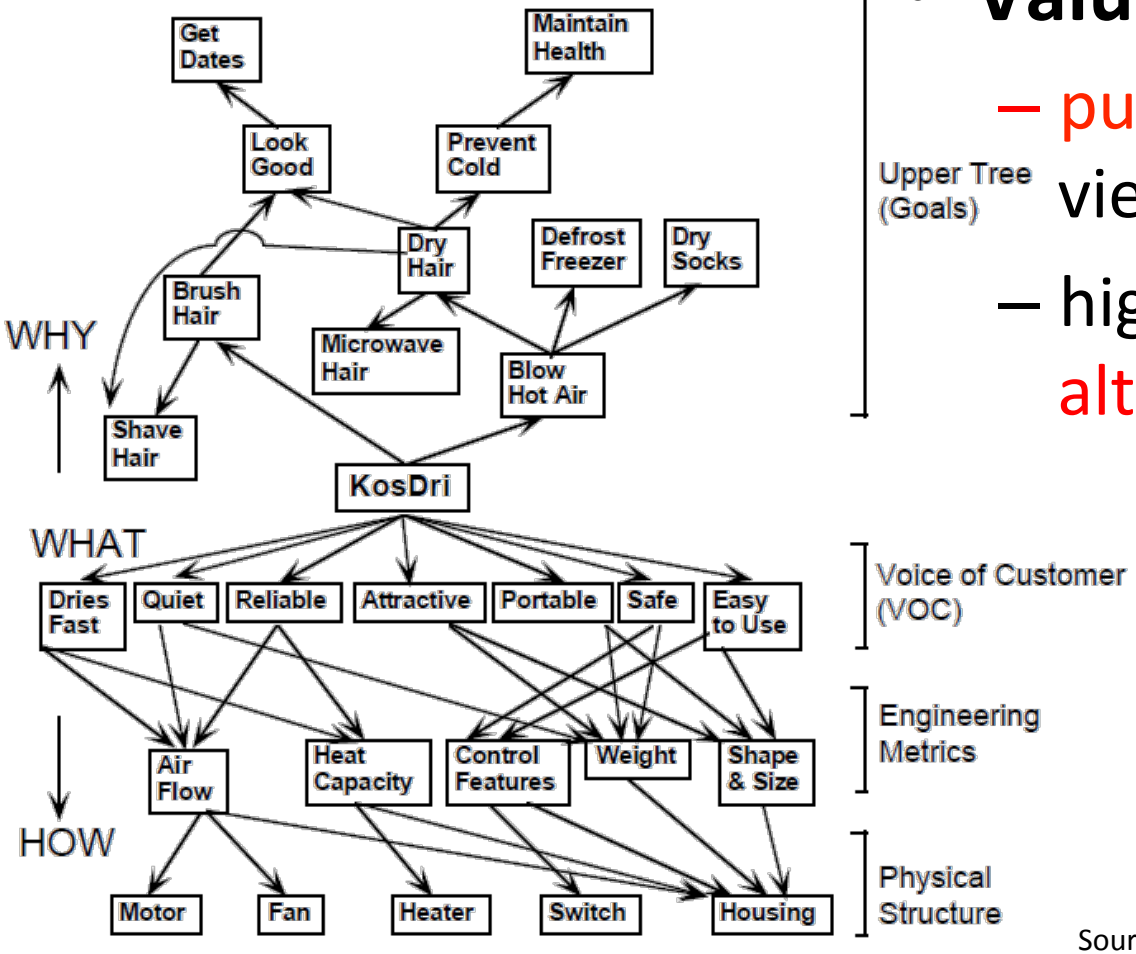


Figure 2.1.3 The Value Graph for KosDri

- **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 idea even when it may be necessary to give up.
- Consider the higher level purpose ("meta thinking") and set your mind free for better design option.
  - Ask your self **"why do we need this for?"** 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

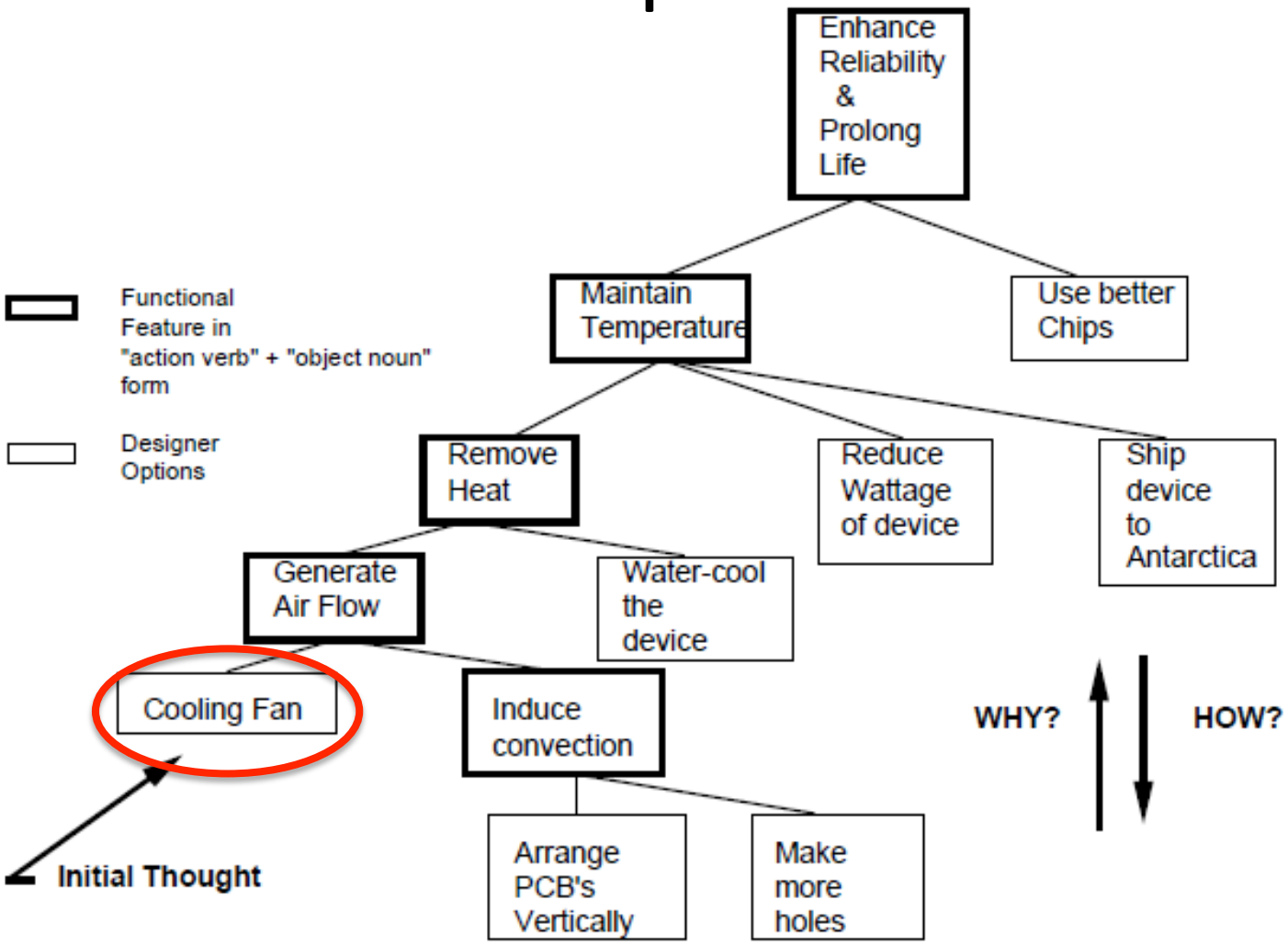
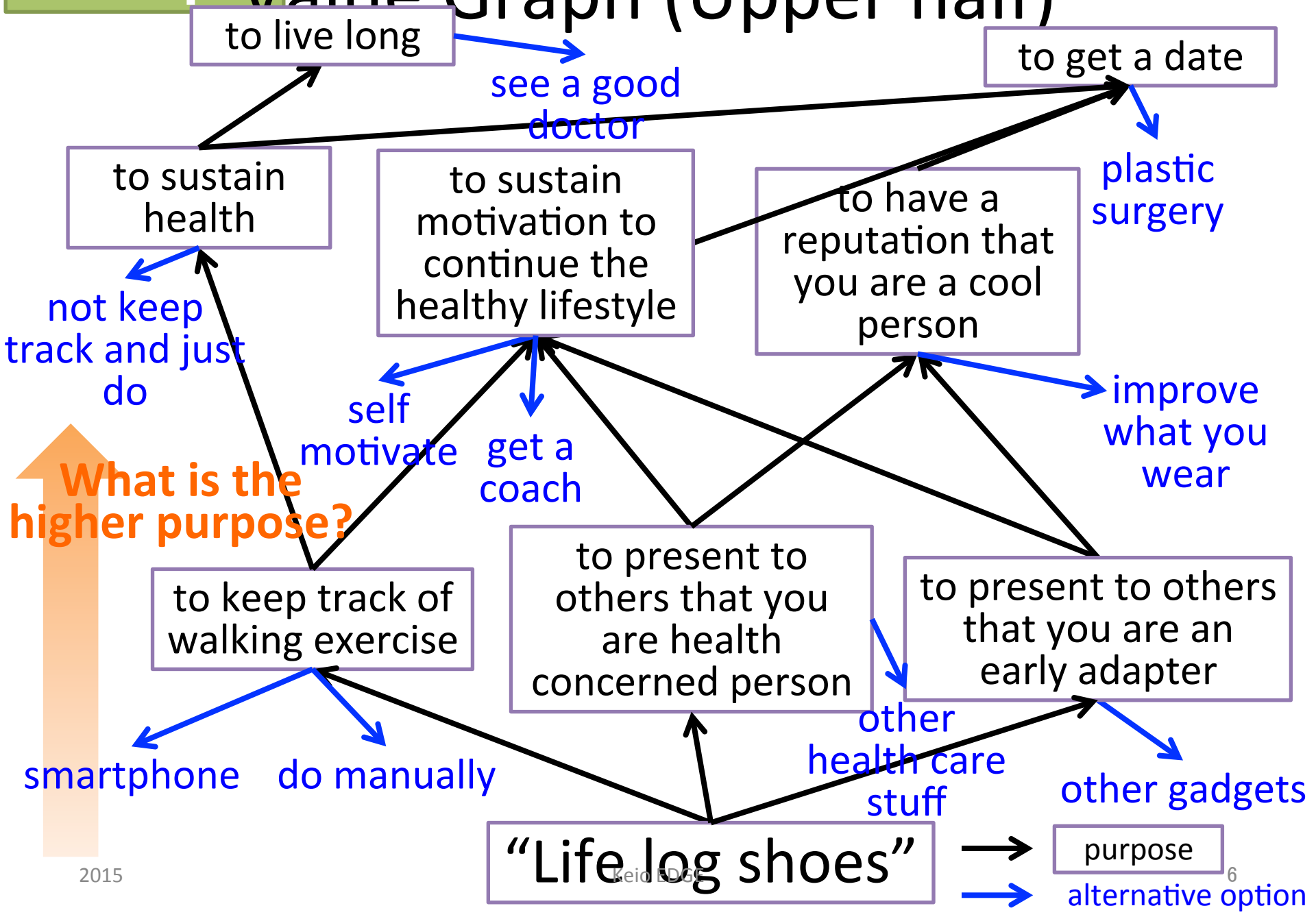


Figure 2.1.2 Identification of Product Values and Goals
(Based on Discussion Held at Apple Corporation, Cupertino, CA, March 1987)

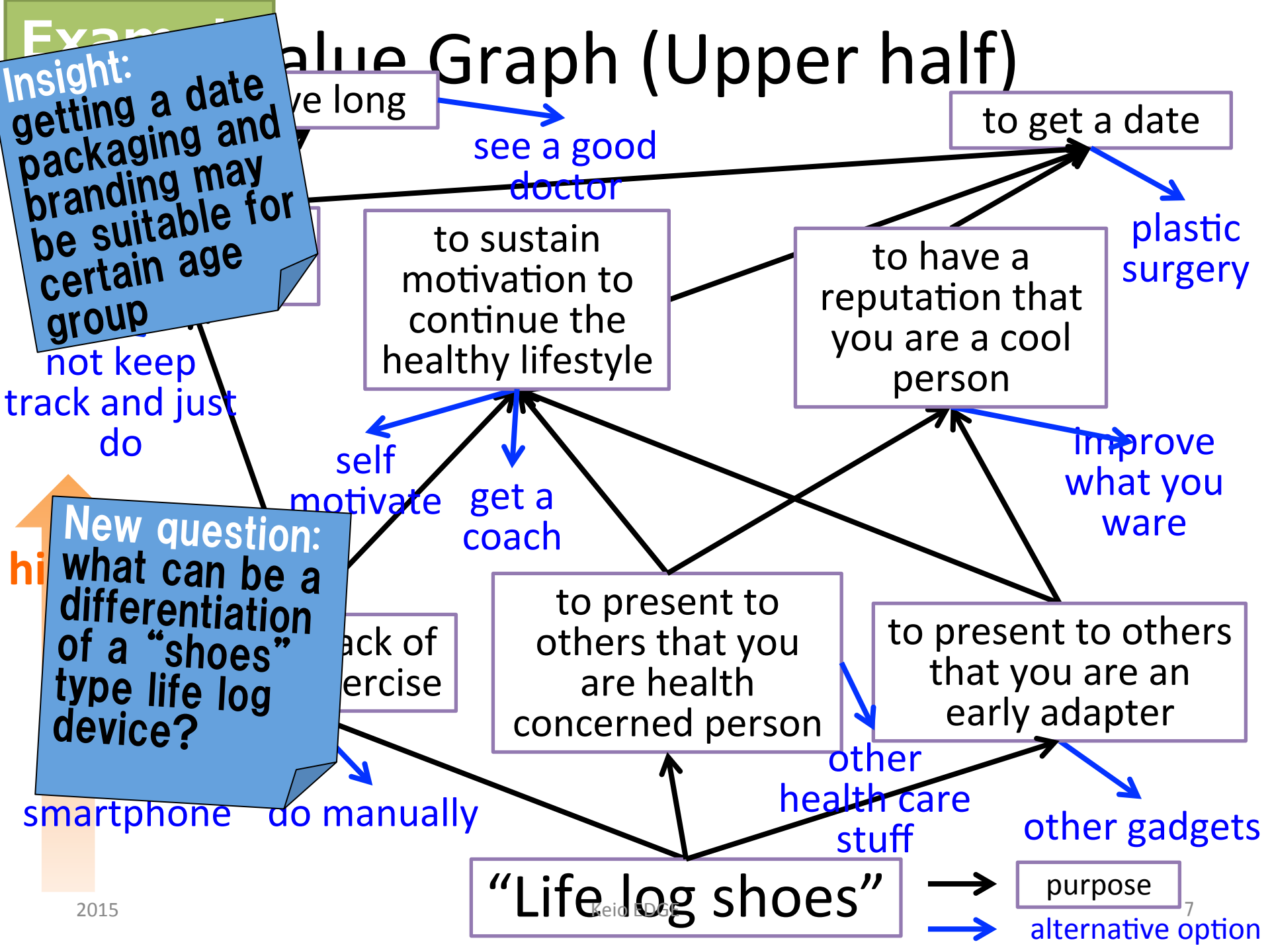
Source: Ishii, K and Kmenta, S. (2003) '2.1 Value Engineering (Value Identification and Functional Analysis)', ME317df*M*: Product Design Value Engineering, Reader, Stanford University.

Example

Value Graph (Upper half)



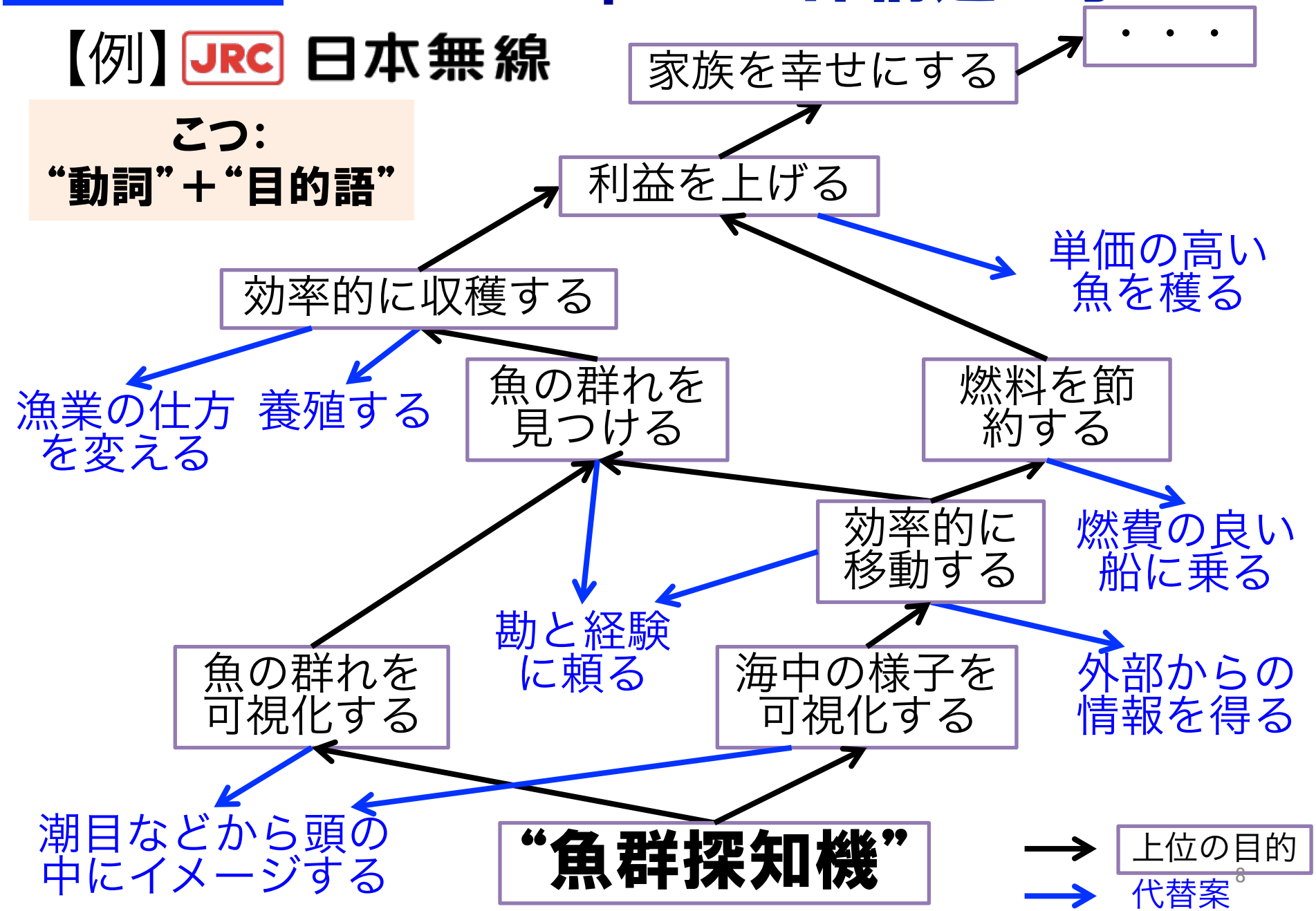
alue Graph (Upper half)



Example Value Graphの上部構造を考える

【例】JRC 日本無線

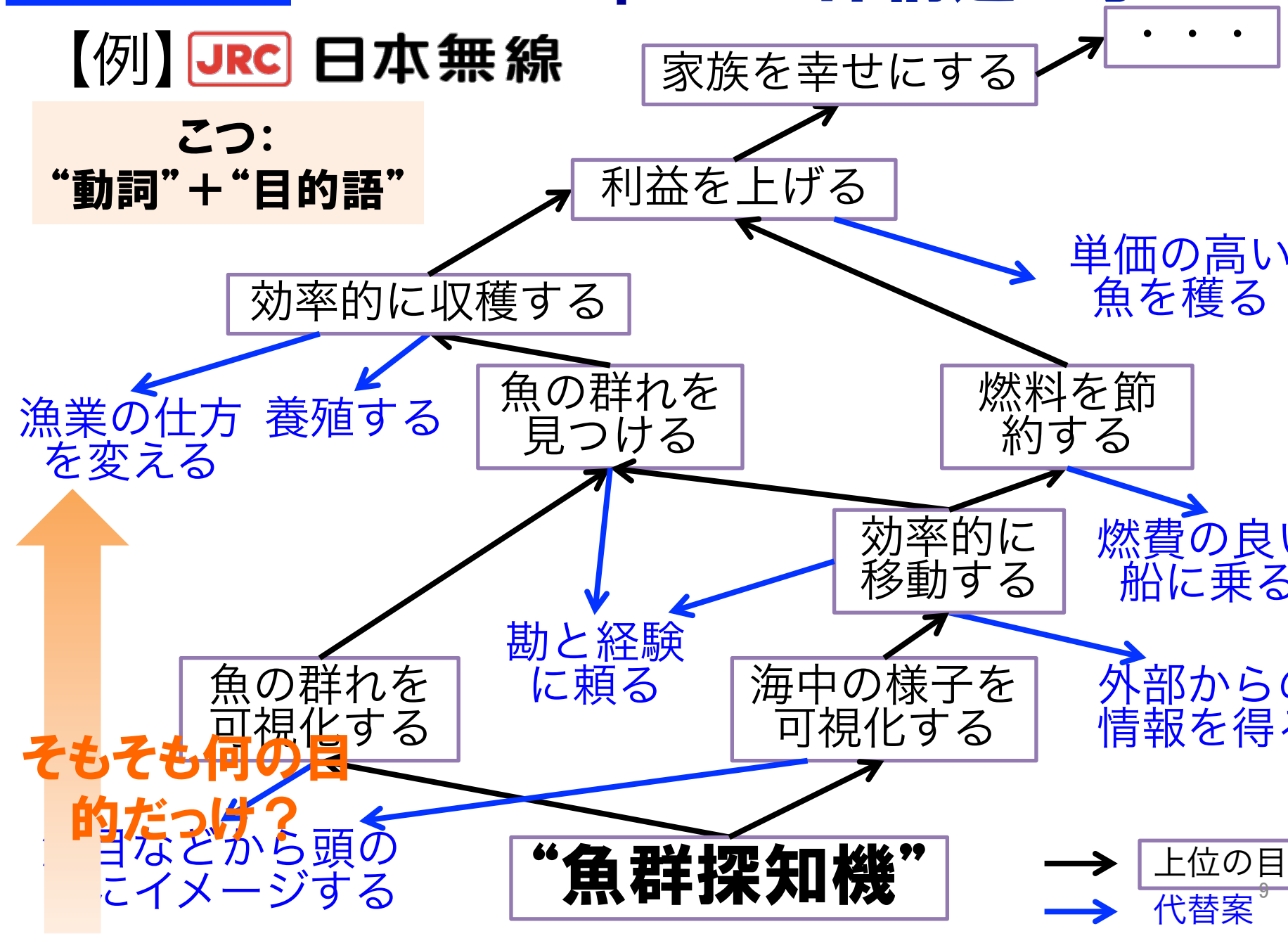
こつ:
“動詞”＋“目的語”



Example Value Graphの上部構造を考える

【例】JRC 日本無線

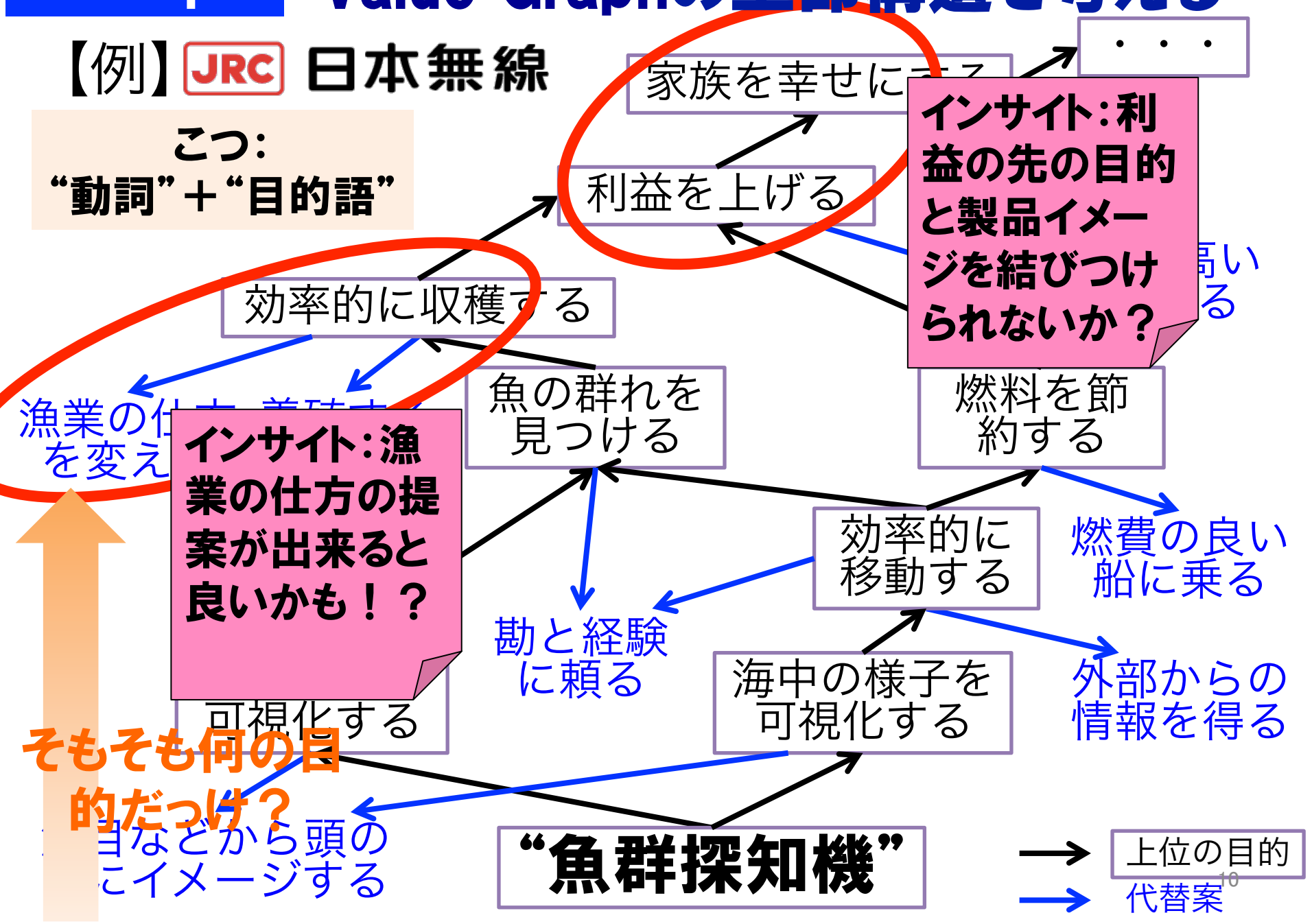
こつ:
“動詞”＋“目的語”



Example Value Graphの上部構造を考える

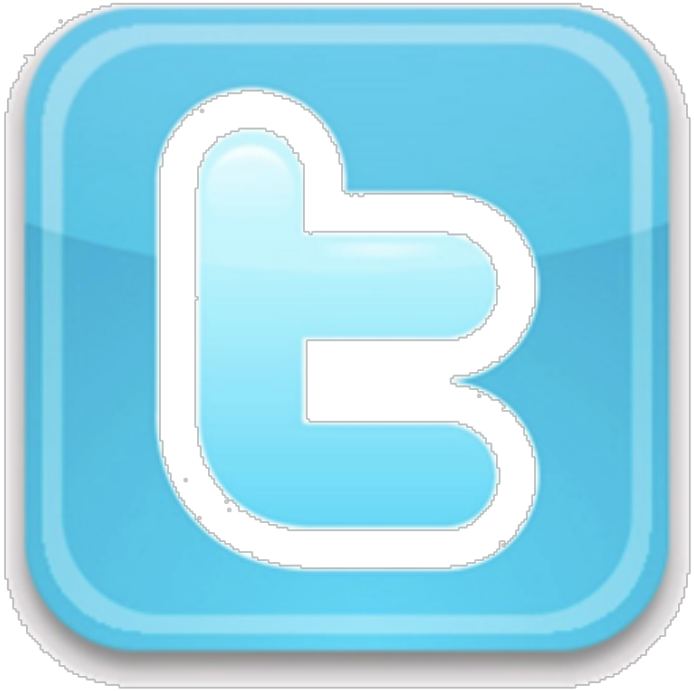
【例】JRC 日本無線

こつ:
“動詞”＋“目的語”



Practice

Value Graph (Upper Half)Creation Practice



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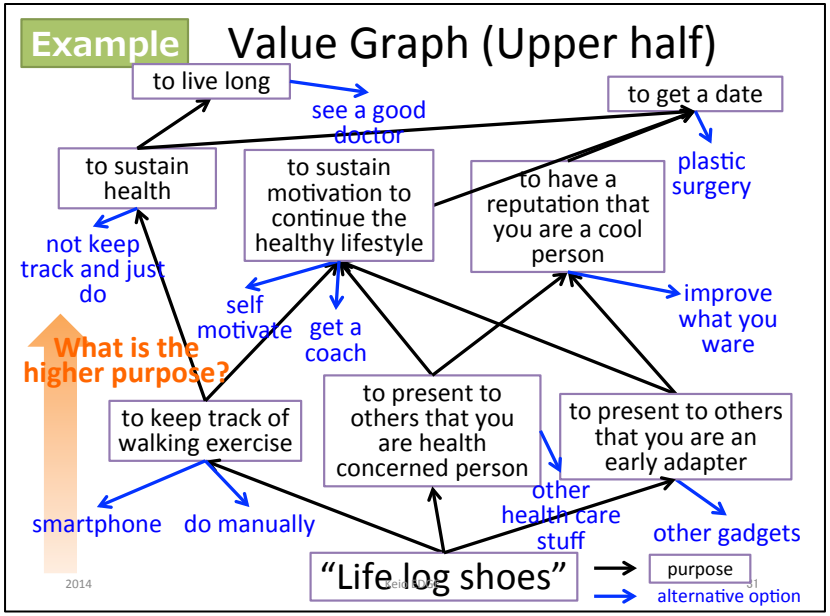
Exercise

Value Graph Exercise 1

- **Discuss and create a Value Graph (Upper Half)** of your idea.

- ☐ More abstract purposes?
- ☐ Whose purpose?
- ☐ Multiple purposes?
- ☐ Alternative options?



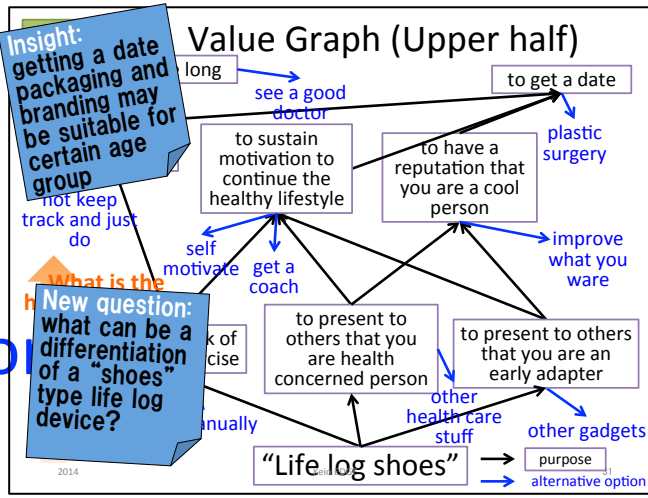
Structurizing and visualizing your purposes and alternative options to expand the solution space

Exercise

Value Graph Exercise 2

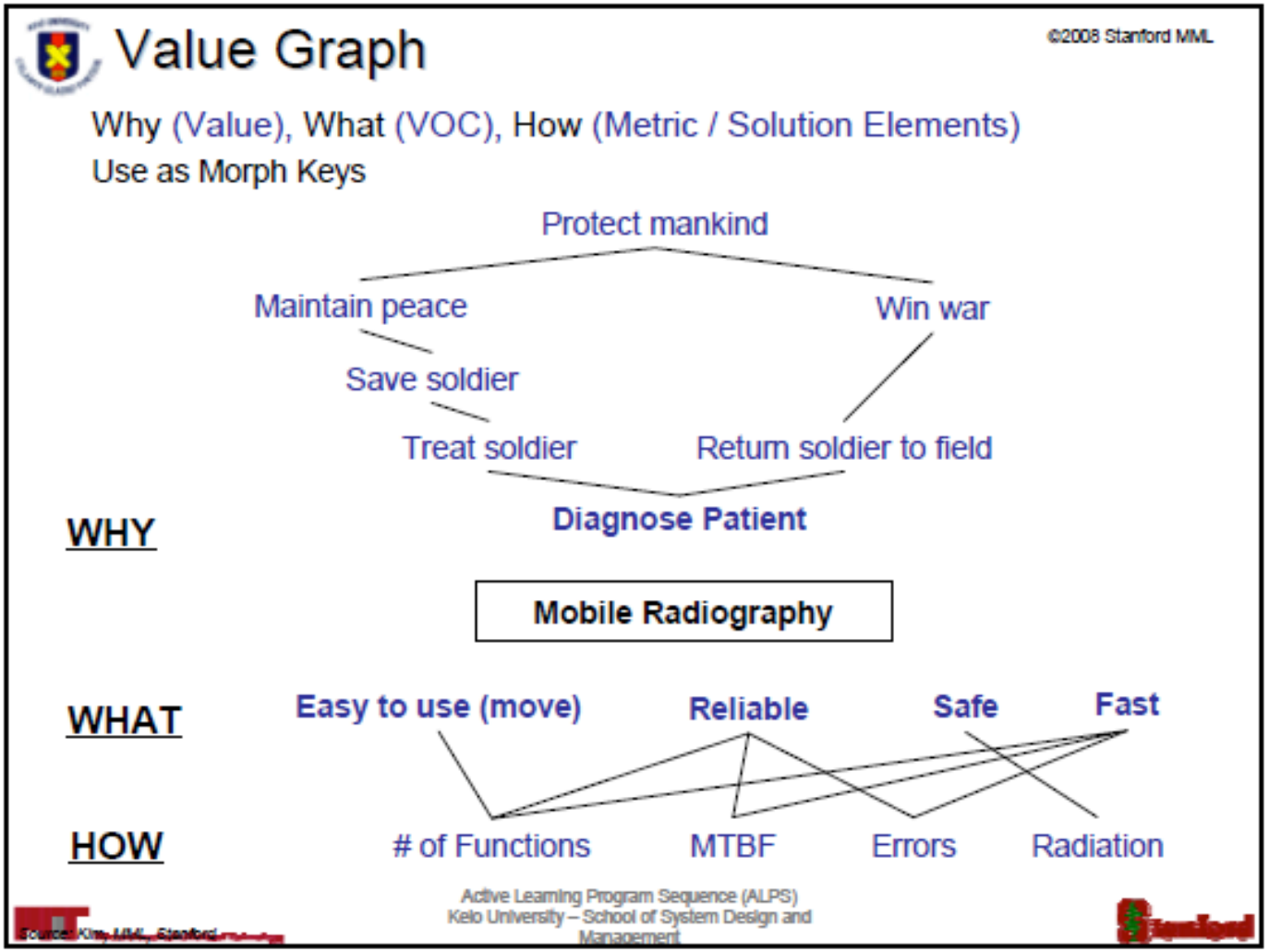
- Discuss about your Value Graph (Upper Half) session. Both process and output.
- Jot down **interesting finding** and **new questions found** during the discussion. They may be important insights.

- ☐ Interesting upper purpose?
- ☐ Interesting 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.