ITU Workshop on Making Television Accessible – From Idea to Reality, hosted and supported by Japan Broadcasting Corporation (NHK)

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Television Receiver Accessibility and International Standardization Activities at IEC

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"Uni & Eco-Change" Television Design Concept

- Universal Design
  - Simple to understand and easy to use
  - Easy to identify display and expression
  - Care for burden on body
  - Pursues safety and user friendliness
  - Considers the way the user feels when using it
- Ecology
  - Reduced energy consumption
  - Removal of materials hazardous to the environment
  - Reduced use of resources
  - Product performance (usage-related environmental performance)
  - Recyclability

Back ground of the development of "Talking" TV ("Shaberu TV" in Japanese)

- Announcement in the meeting presented by the organization for Visually impaired people in July,2006
  - TV is the most important source of information to visually impaired people
  - They are afraid of that TV might be very difficult to use because of its advanced and complicated function due to digitalization.
- A function of voice reading out indications on TV screen would be a great benefit to a lot of people for a coming aging society

Start study of voice read-out function for TV **("Talking" TV)**

Requirements for "Talking" TV

- Better to provide a voice read-out function ("Talking TV") to all users without excessive cost up
  - Realize the function by software
  - Utilize our possessed technology actively

Voice Guidance Technology for Car Navigation System

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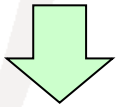
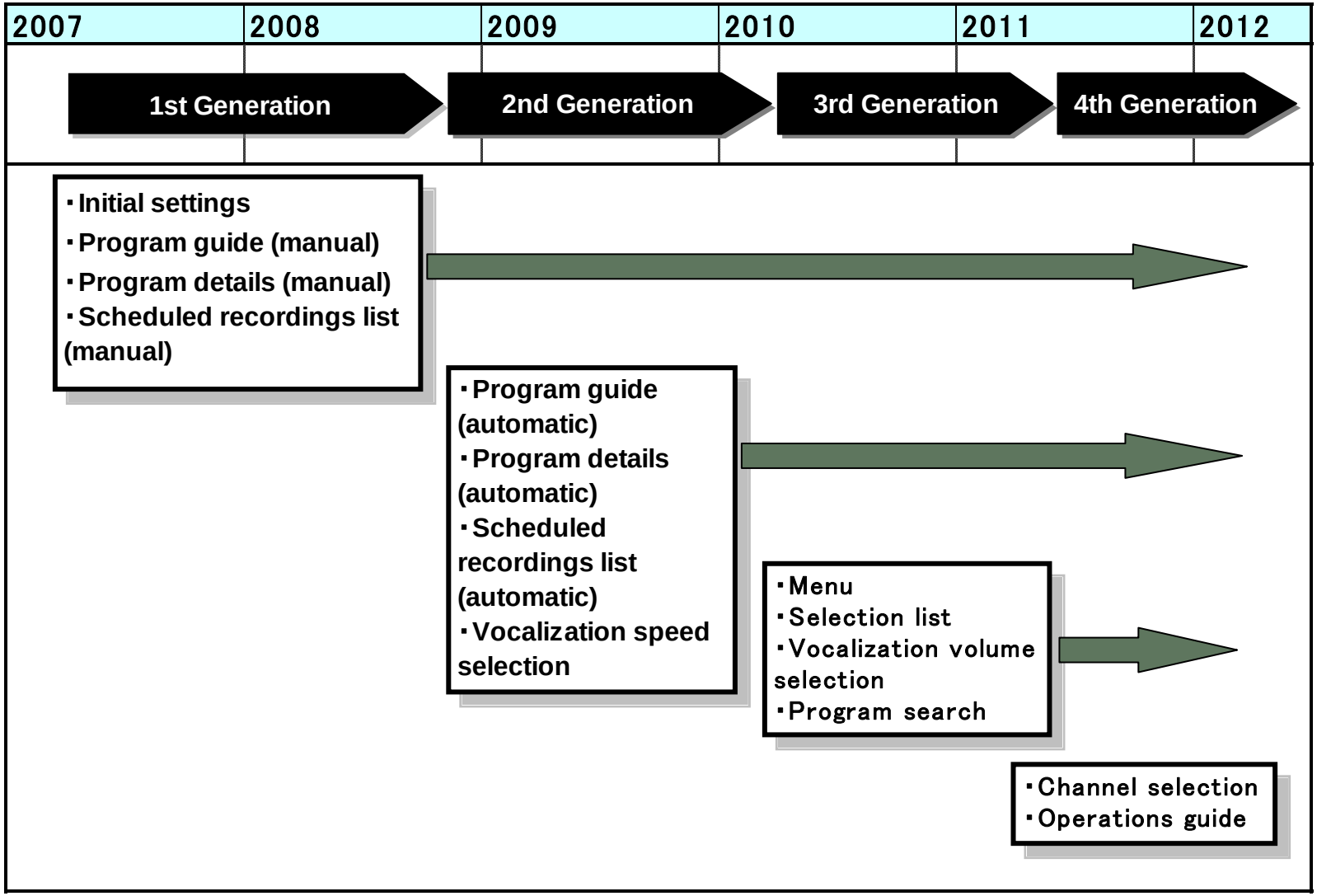
User Interface Technology which we have cultivated for the development of domestic appliances.



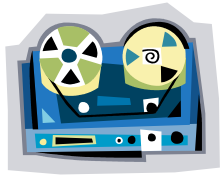
Voice Read-out function

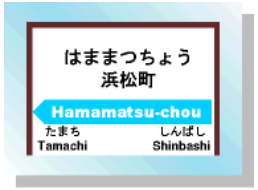
Read-out Function Development Roadmap



TTS Engine Overview

- Recoding and Editing
  - Recording human voice of the determined sentence and phrases
  - Sentence output by arranging words and short phrases
    Examples: Train platform announcements, electrical home appliance (refrigerators, washing machines, rice cooker, etc.) audible guidance

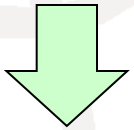




- Text-To-Speech (TTS) Synthesis
  - Written text converted to voice and read-out
  - Arbitrary text can be read out automatically
  - Reading speed and pitch can easily be adjusted
    Examples: Reading out email and web pages

TTS Engine Overview

In building a television “Read-out” function, the system must be able to read TV program titles, actors’ names and program details which may include neologisms and coined words.



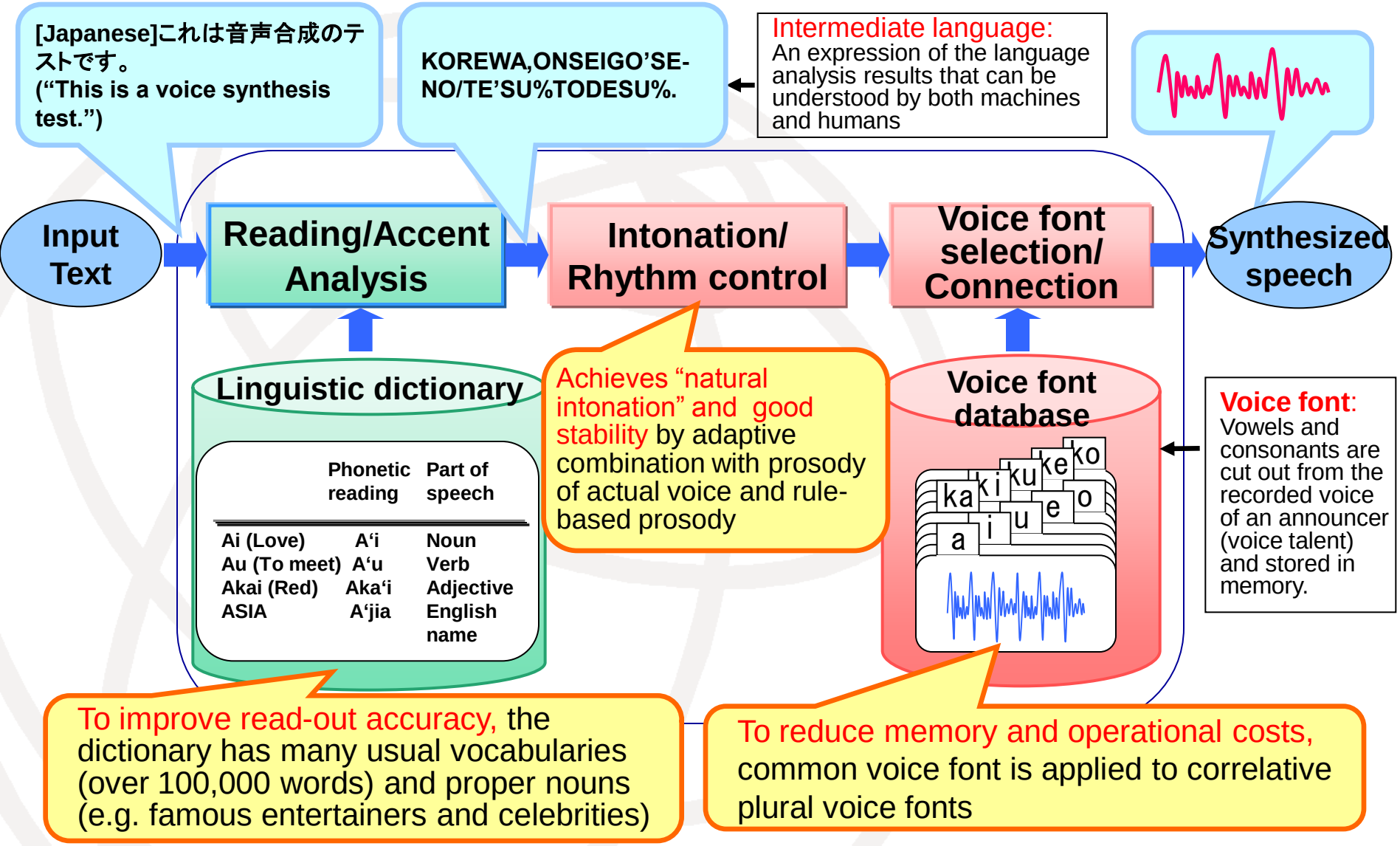
It is not possible to make preset recordings of all vocabularies in advance.

A Text-To-Speech (TTS) synthesis function is required.

Requirements Concerning TTS Engines for Television

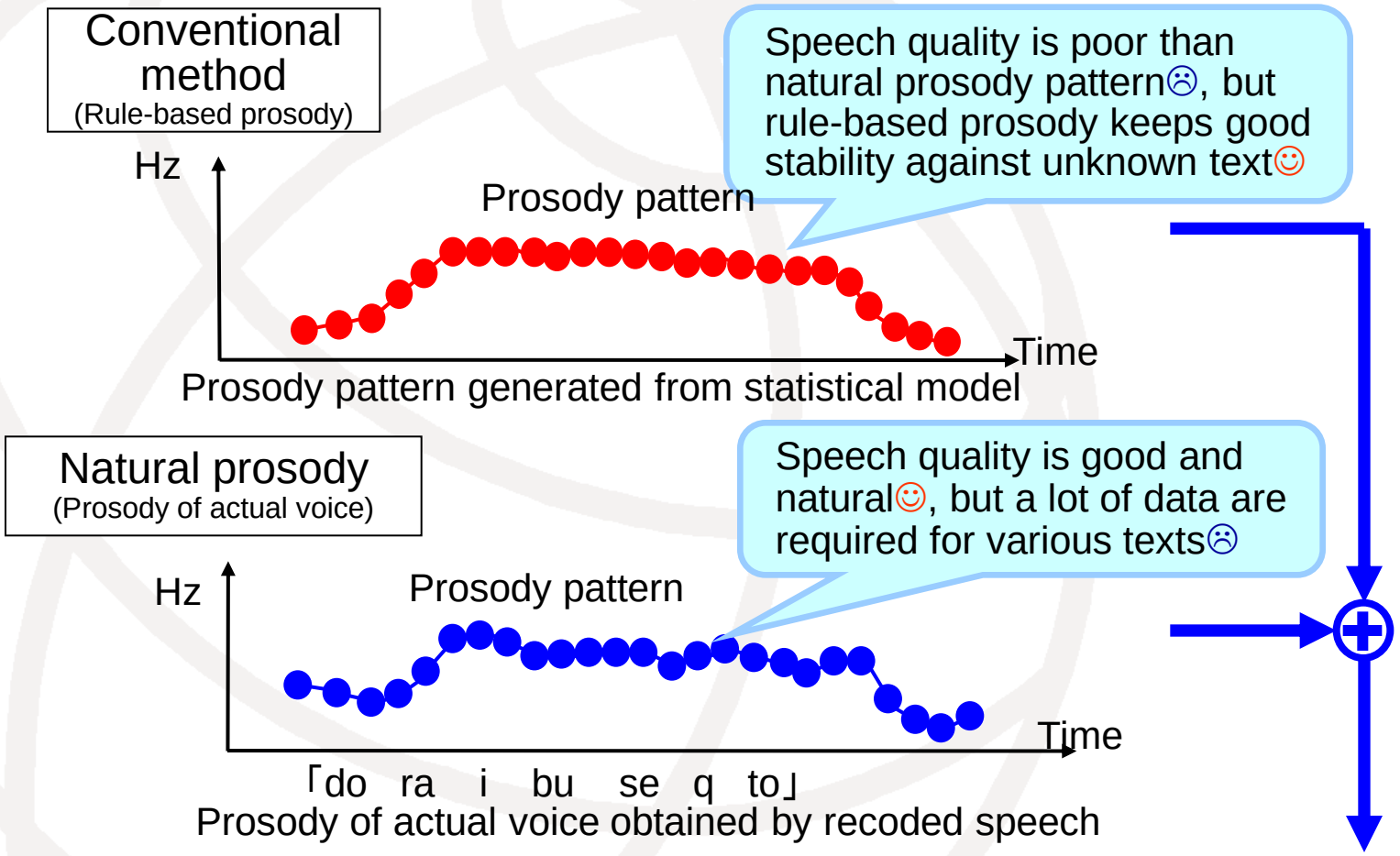
- Program titles and details have many proper names and specialized text formats which have a negative impact on the accuracy of read-out.
  - Accuracy can be improved by providing a proper name dictionary.
- It is necessary to reduce processing cost and memory.
  - Achieve processing cost / memory reduction and maintain sound quality by sharing common voice font.
- Improvement of comprehensibility requires more natural sound synthesis.
  - Achieve natural intonation by using the rhythms estimated from actual voice samples.

TTS Engine Framework



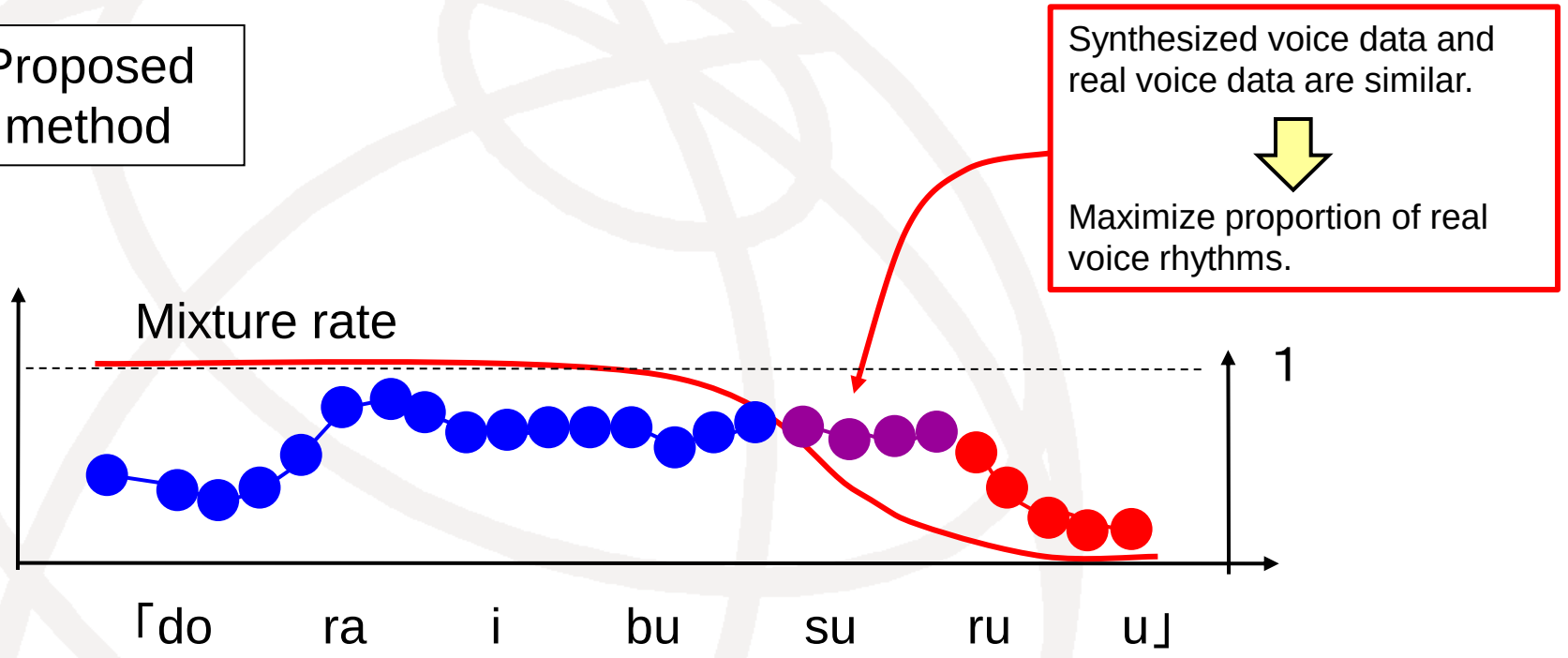
Feature of our TTS Engine

In the conventional method, intonation has been monotone and mechanical.



Feature of our TTS Engine

Proposed method



By adaptive combination with Natural prosody and rule-based prosody, **synthesized speech quality become more natural with good stability.**

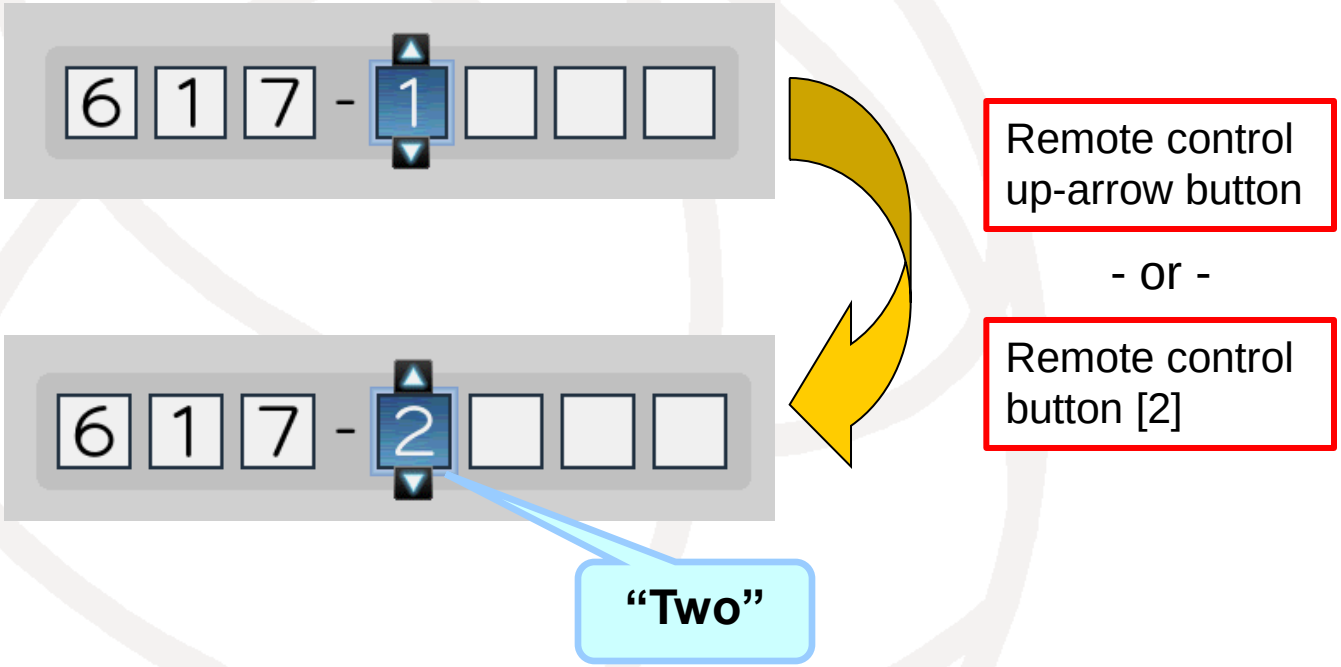
Related patents (text-to-speech system): 12

User Interface Technology (1-1)

- Initial Settings (Easy Startup Settings)
  - Voice guidance is used to introduce user to the initial settings right after purchase.

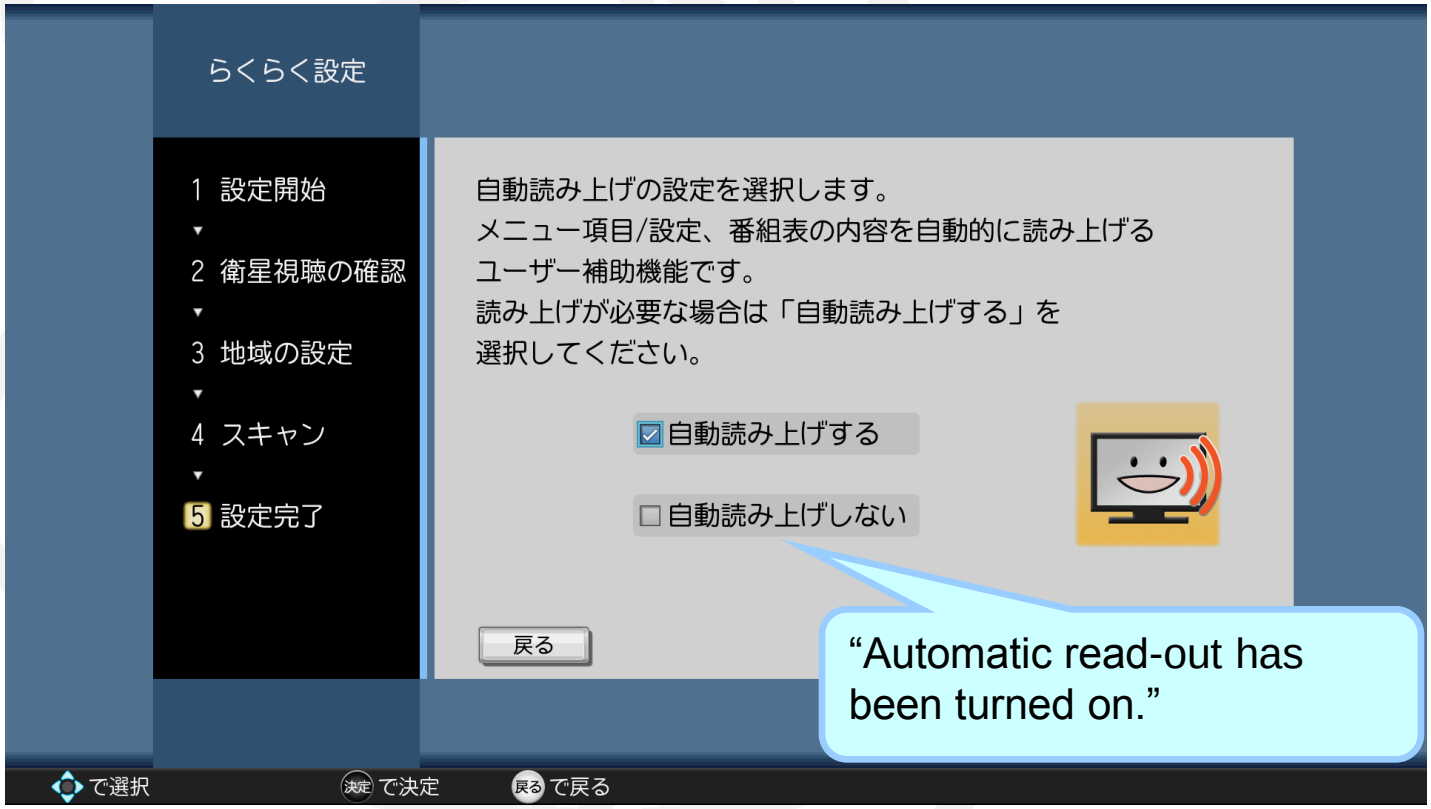
User Interface Technology (1-2)

- Initial Settings (Easy Startup Settings)
  - Voice guidance is also used to support postal code input.



User Interface Technology (1-3)

- Initial Settings (Easy Startup Settings)
  - User can turn on/off automatic read-out function in the initial setting screens.



User Interface Technology (2)

- Display of channel information
  - Read out channel information (type of the broadcast such as DTV/BS/CS, channel name and program name) when turning on or changing channel.

User Interface Technology (3-1)

- EPG (Electronic Program Guide)
  - The system reads out details about the program on which the cursor is resting. Read-out function is also used to help the user schedule recordings.

User Interface Technology (3-2)

- EPG (Electronic Program Guide)
  - Content to be read out
    [Channel Name][Program Name][Broadcast Date][Reservation Info]
  - Shortening read-out time
    - Omit channel name when same as previous
    - Omit broadcast date when it is today
  - Handle the extended symbols defined in the ARIB standard
    - Translate the ARIB extended symbols included in program names.

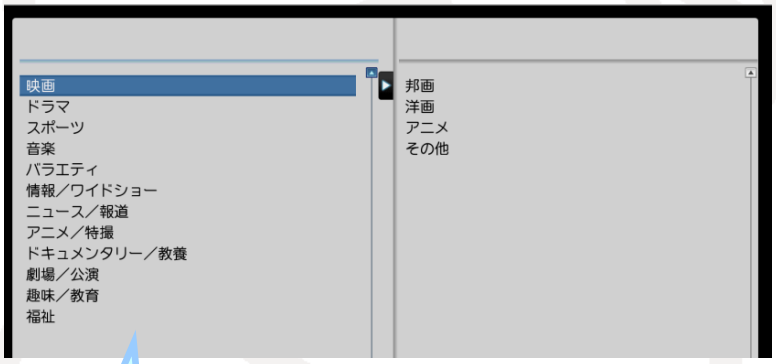
新	"New program"	再	"Rebroadcast"	終	"Final episode"
解	"Voice over narration"	二	"Bilingual"	字	"Subtitled"

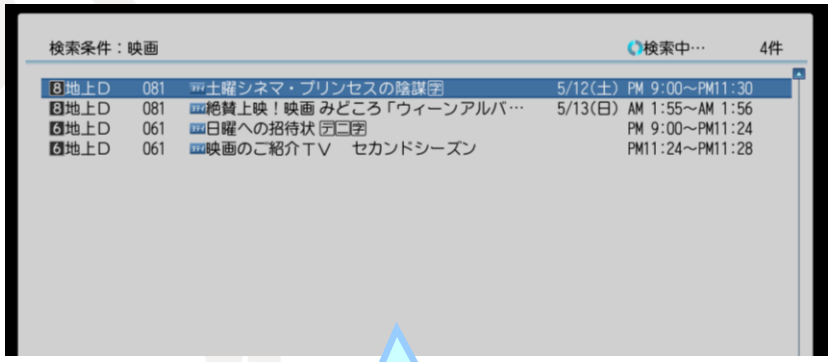
*There are over 30 such commonly printed symbols.

*ARIB: Association of Radio Industries and Businesses

User Interface Technology (4)

- Program Search
  - User can search for TV programs and schedule recordings without looking at the screen by using the voice guidance.





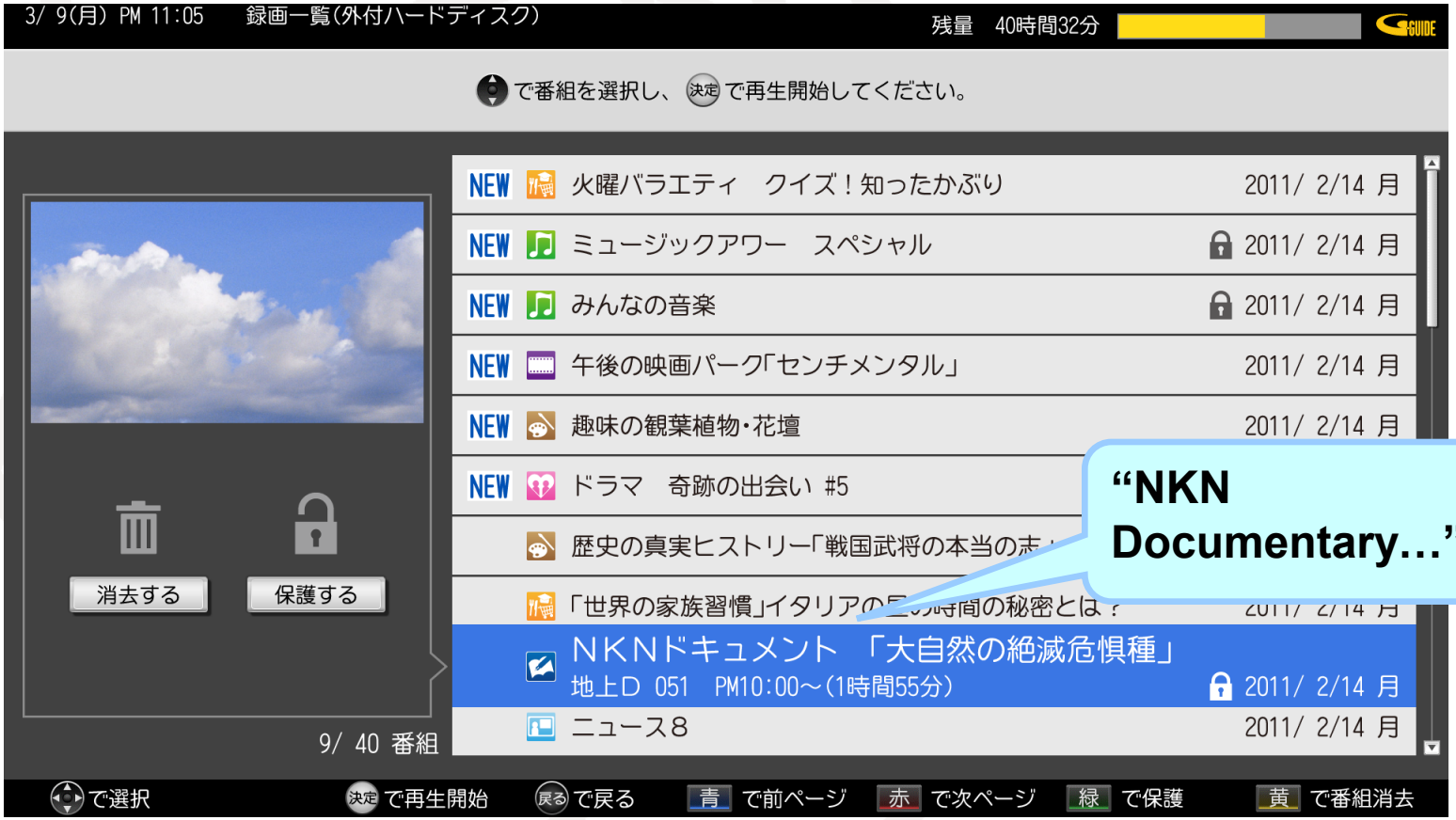
“Movies”

Press the remote control “OK” button.

“Digital terrestrial broadcast: Saturday Cinema…”

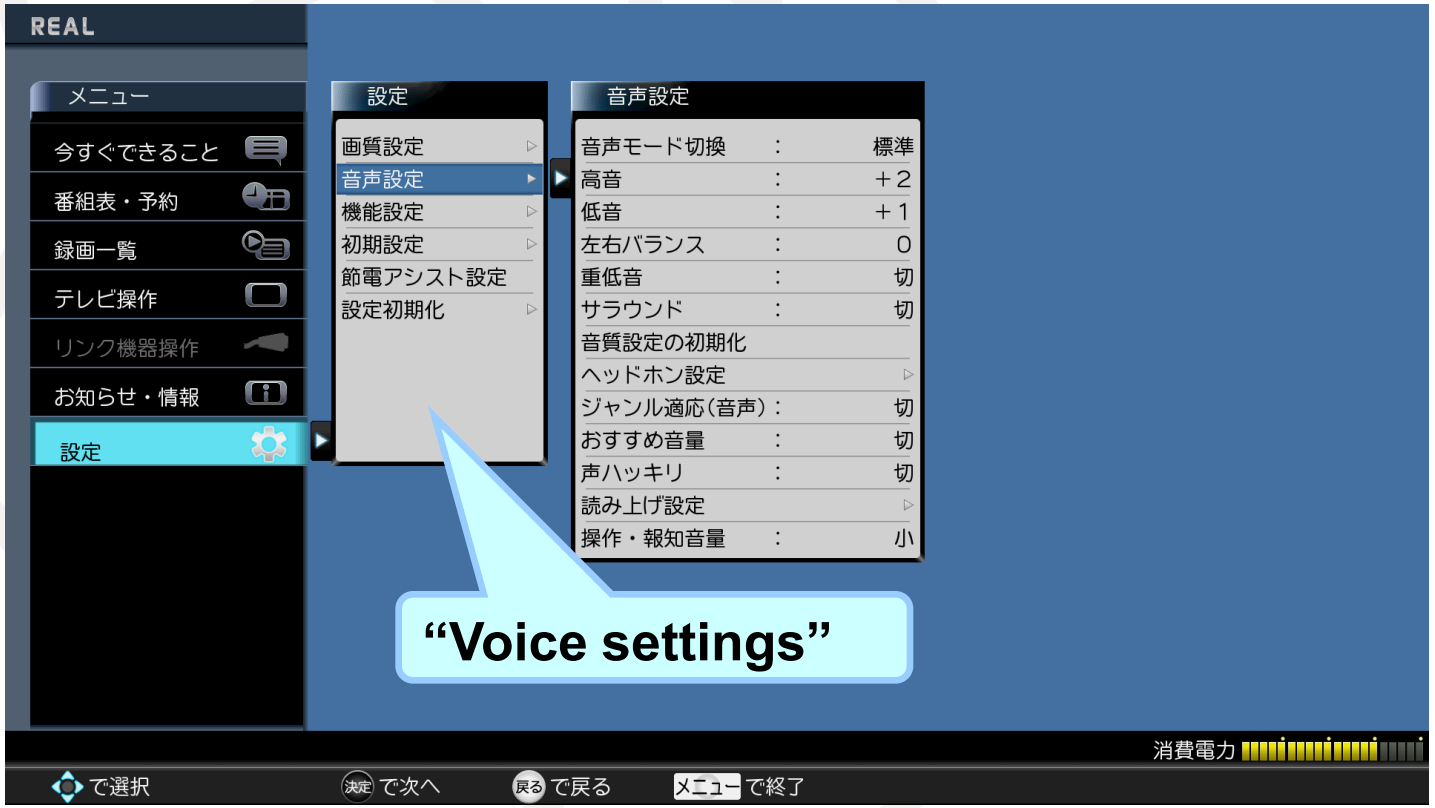
User Interface Technology (5)

- Program List
  - The selection of which program to record is also supported by read-out.



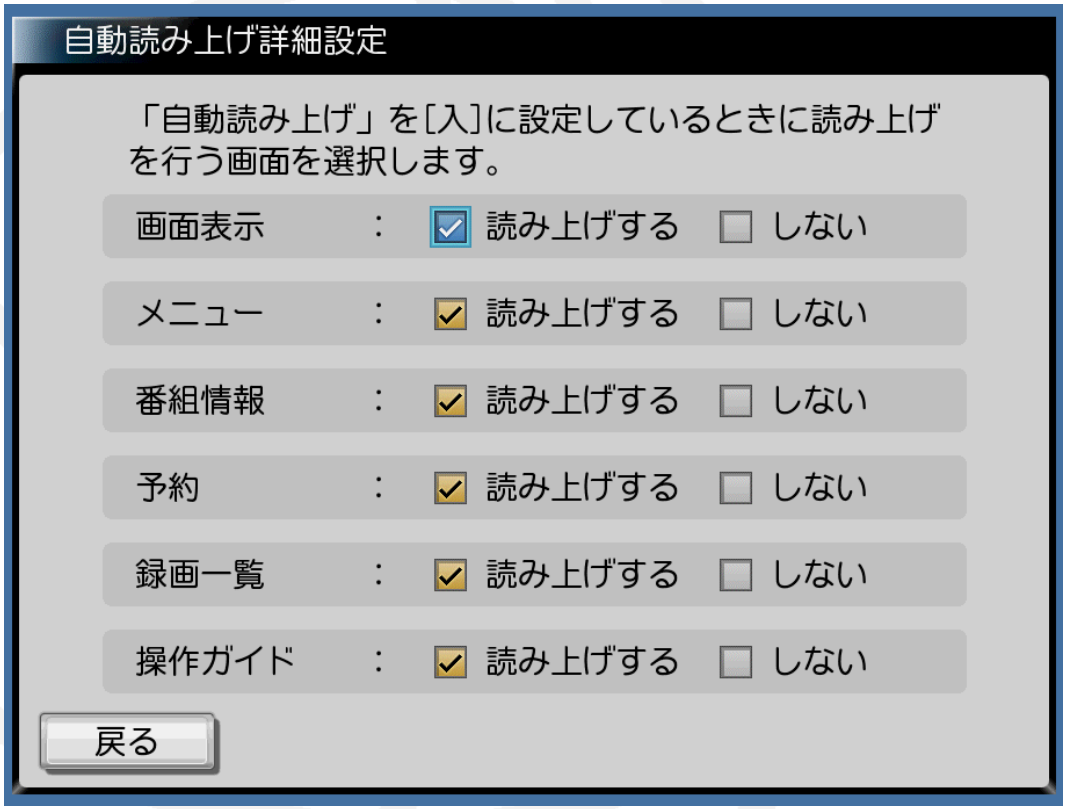
User Interface Technology (6-1)

- Settings Menu
  - As the user moves the cursor with the remote control, the system reads out the menu item to which the cursor points.



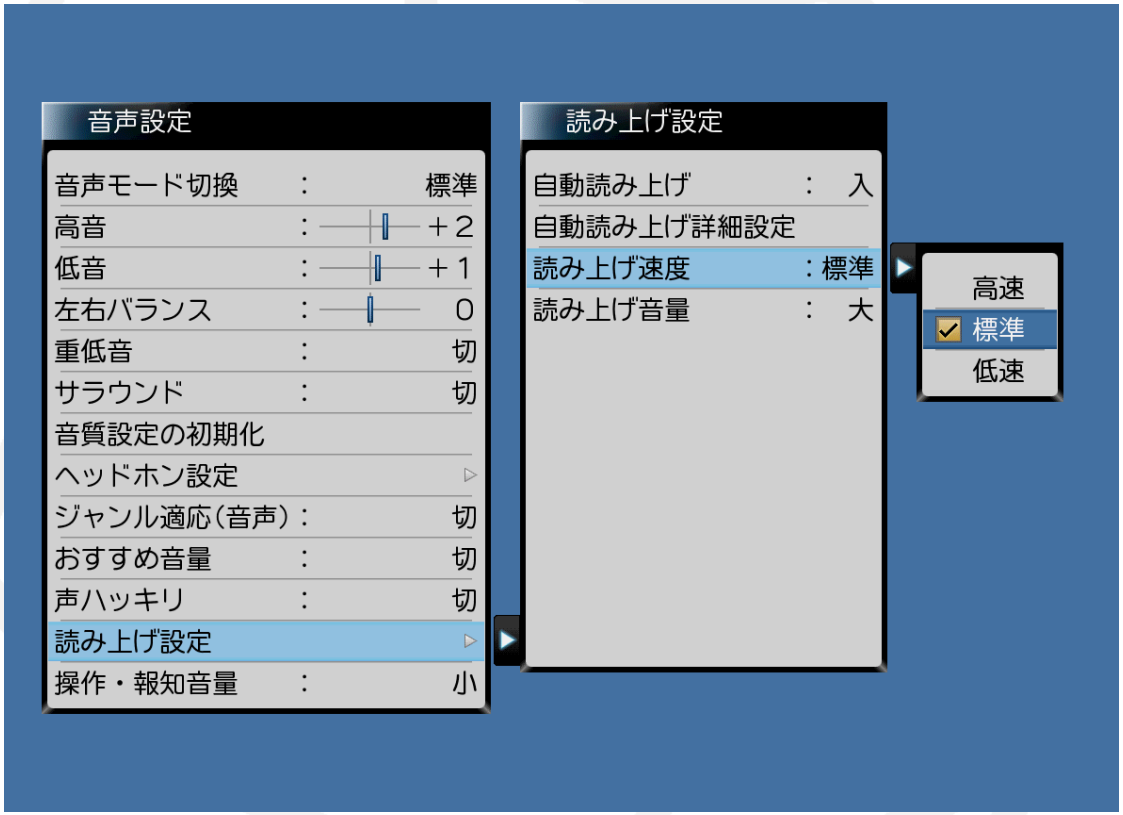
User Interface Technology (6-2)

- Settings Menu / Automatic read-out Detailed Settings
  - User can choose to turn on/off read-out in different situations.



User Interface Technology (6-3)

- Settings Menu / read-out Speed Settings
  - User is able to change speed of read-out (3 speeds).



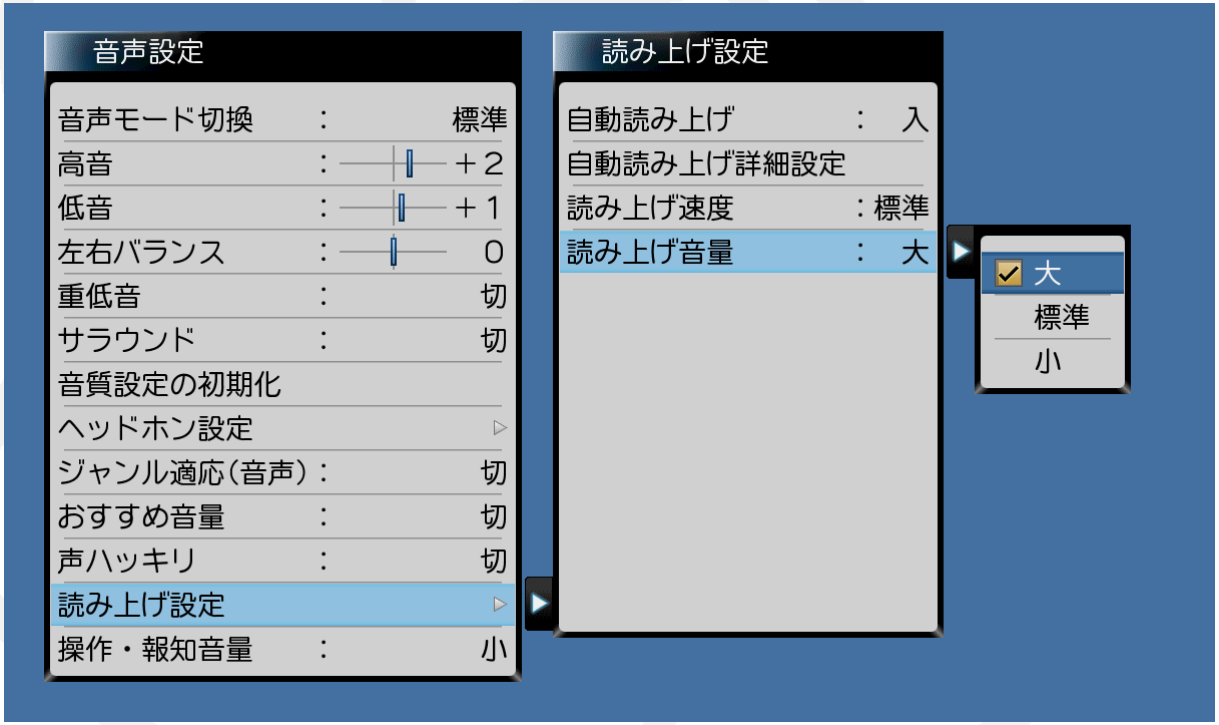
Fast: About 1.7 times normal speed

Normal speed

Slow: About 0.8 times normal speed

User Interface Technology (6-4)

- Settings Menu / read-out Volume Settings
  - User can select from 3 levels of read-out loudness.



User Interface Technology (7)

- Operations Guide
  - If the user has not completed an operation within a certain amount of time, the help message displayed at the bottom of the screen is read out.

IEC International Standardization

- Overview
  - Europe (DIGITALEUROPE) has made a proposal for international standardization of TTS capable broadcast receivers in order to assist the visually impaired in watching TV.
  - In Japan, this is handled by the JEITA Multimedia Accessibility Project Group, which is making deliberations toward establishment of standards.

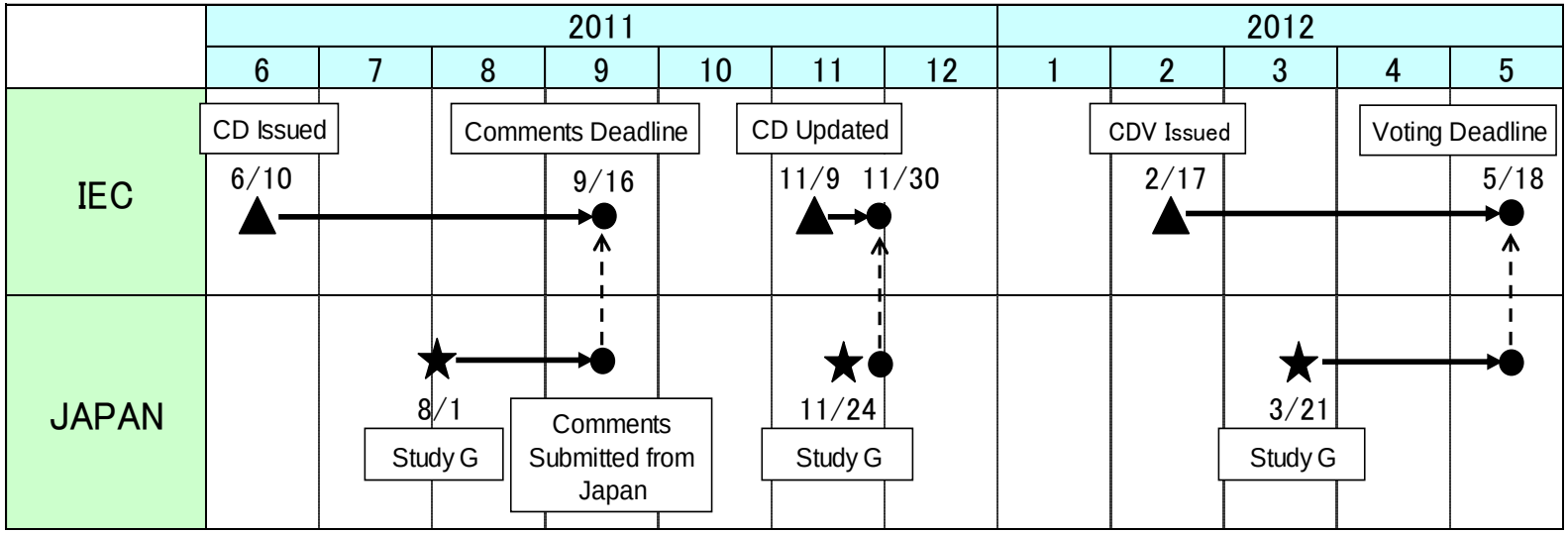
*IEC: International Electrotechnical Commission

*JEITA: Japan Electronics and Information Technology Industries Association

*TTS: Text-To-Speech

IEC International Standardization

- Standardization Timeline
  - June 2011: Committee Draft (CD) issued
  - February 2012: Committee Draft for Vote (CDV) issued
  - May 2012: CDV voting completed
    If recognition of CDV is completed, the contents of the standard is mostly fixed, so it would be standardized through voting for the final draft international standard (FDIS) .



Committee Draft for Vote (CDV) Overview

- Scope
  - Targeted devices
    - Devices capable of receiving digital broadcasts such as digital televisions, set top boxes and recorders whose primary function is to receive TV content.
    - Not including devices for which broadcast reception is a supplemental function (PC, game consoles, etc.)
    - Not including external add-on devices such as tuner cards for PCs
  - Main features of the standard
    - Basic functional description for a TV-TTS device combination or TV with integrated TTS.
    - Profiles for different levels of TV-TTS functionality.
    - Targeted towards the digital TV application.

Committee Draft for Vote (CDV) Overview

- Functional Requirements
  - The delay between an event and the resulting TTS audio related to that event shall be such that they are perceived as belonging tied together.
  - Priority TTS audio shall overrule currently playing TTS audio information.
  - The user should be able to stop currently playing TTS audio.
  - The user shall be able to repeat the current or previous TTS audio.
  - The user shall be able to mute the TTS audio.
  - The user shall be able to switch on/off the TTS function.

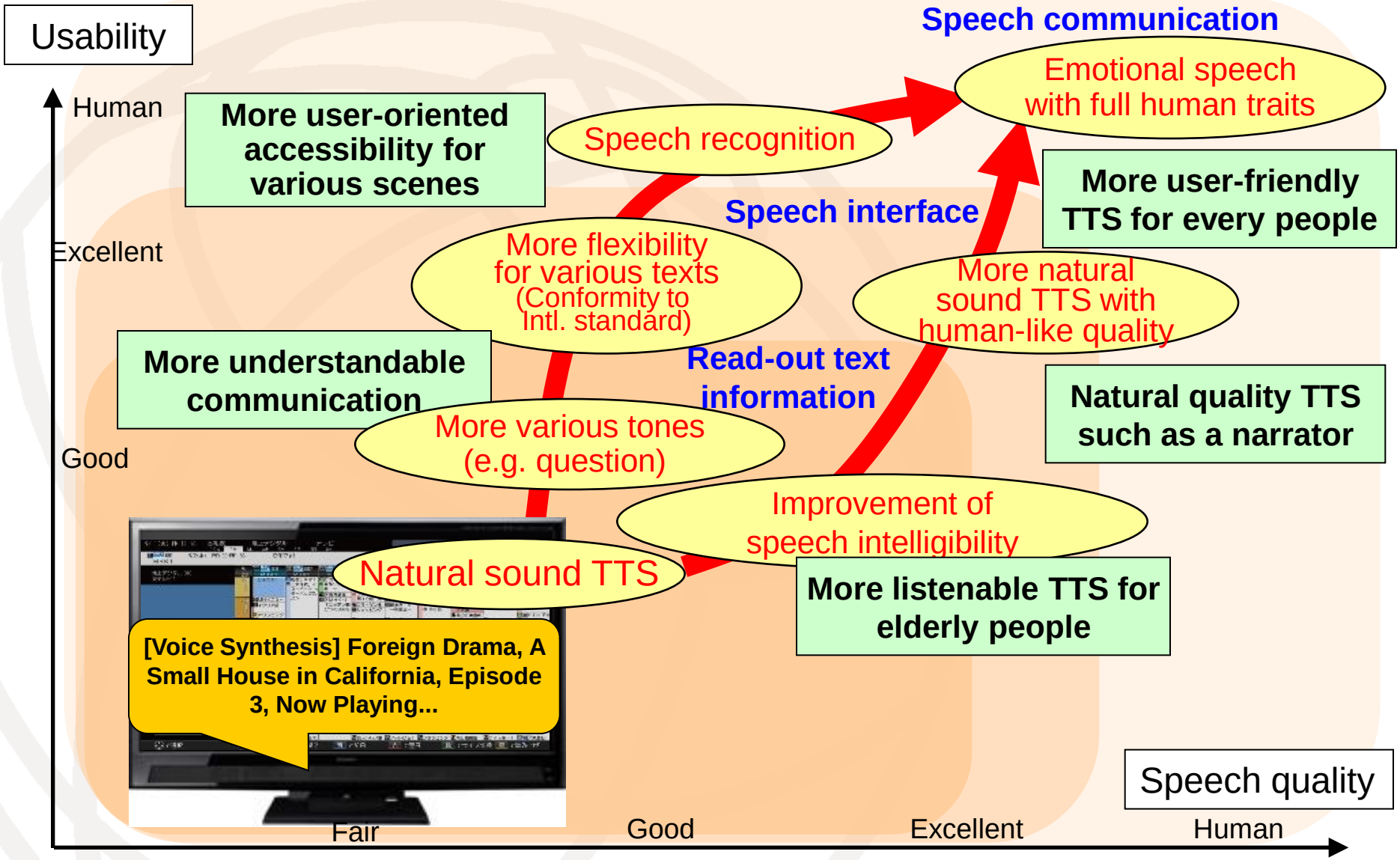
Committee Draft for Vote (CDV) Overview

- Overview of context which is read out (1)
  - Watch TV / EPG (Electronic Program Guide) context
    - Channel information, other Additional information
  - Menu / List context
    - Menu / List title and Number of Menu / List items , other Additional information
    - Selected and/or changed item
  - Timeshift context
    - Playlist, Commands (play, pause, rewind, forward, stop, record, etc), other Additional information

Committee Draft for Vote (CDV) Overview

- Overview of context which is read out (2)
  - Standby
    - Switching to standby.
  - Pop-up message
    - Any warnings and notifications, such as turning issues or PIN control.

Future Roadmap

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