INCLUSIVE DTV

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INDIAN INSTITUTE OF SCIENCE CPDM

- More than 100 years old
- initiated IIT, NIT and IISER systems in India
- Only Indian university in the top 100 ranking
- Only Indian university in the top 10 small (<5k students) universities
- Centre for product design and manufacturing
  - Oldest design school in India
  - Pioneered in design research
  - Set up incubation centre for productization

I^{3}D Lab

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Gallery

The Intelligent Inclusive Interaction Design (I^{3}D) Lab undertakes research in the field of human computer interaction, intelligent user interfaces and inclusive design. Existing sponsored and student projects considered new interaction techniques for people with different range of abilities, automotive and military aviation environments. Previous research explored user modelling for people with wide range of abilities and developing new interactive systems involving eye gaze, head, hand and finger movement trackers. Present Projects include

1. IT4All, **DST SERB Early Career Fellowship**, Govt of India (2017-2020)
2. Reducing pilots' cognitive load by facilitating human machine interaction in military aviation environment by **Aeronautical Research and Development Board, MoD, India** (2017-2019)
3. A Smart Manufacturing Test Bed for Biomedical Devices by Robert Bosch Centre for Cyber-Physical Systems (2016-2019)

We have got a Best Paper Award at IEEE International Conference on Control, Instrumentation, Communication & Computational Technologies (ICCICCT-2016)

Useful Links

HCI Course Lecture Notes

Geo-Tagging Portal

Download Cambridge Simulator

Students' Handbook

How to write good research paper and give good research talk

VIDEO DEMONSTRATIONS

CONTENT

- WHY TV – A USER SURVEY AT INDIA AND EUROPE
- ACCESSIBILITY IN TV – SUMMARIZING ITU-T FGAVA
- COMMON USER PROFILE – STANDARDIZING USER MODEL
- EU GUIDE – CASE STUDY OF ACCESSIBLE DTV

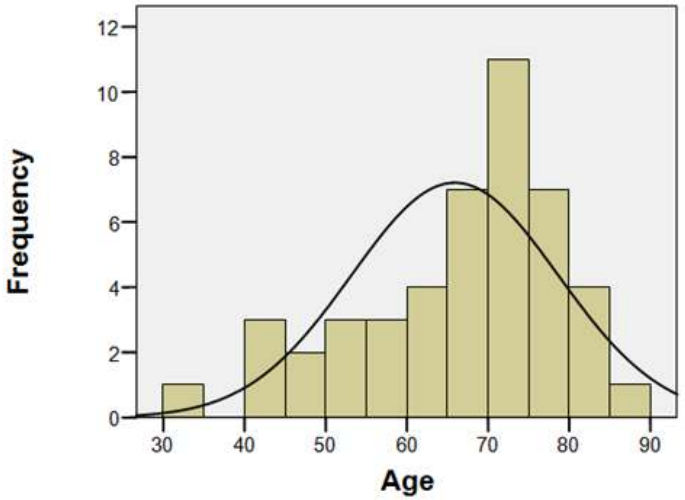
USER SURVEY

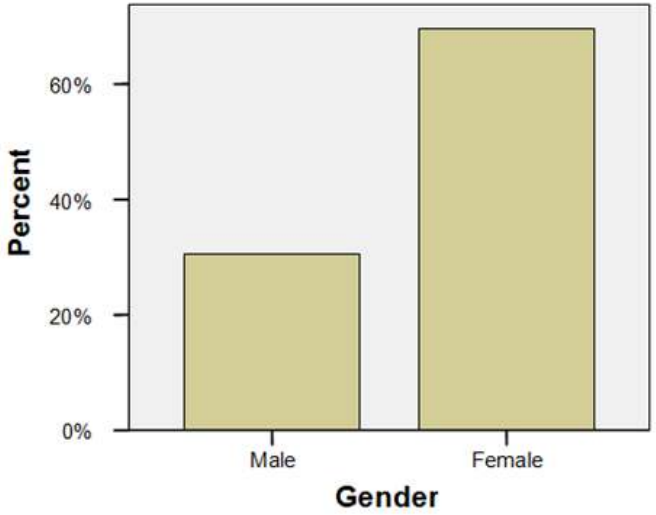
STRATEGY

- User Survey
  - Requirement generation
  - Range of abilities of users
- Usability enhancement
  - Personalizing system
  - Validating personalized system
- Exploring new modalities of interaction

PLACES OF SURVEY

USER DEMOGRAPHICS





METRICS

- General
  - Age
  - Gender
  - Profession
  - Education Level
- Visual
  - Minimum Font Size / Visual Acuity
  - Distortion in vision – Amsler Grid
  - Colour Blindness – Ishihara Test
- Cognitive
  - Trail Making Test
  - Digit Symbol Test
- Motor
  - Grip Strength
  - Active Range of Motion of Wrist
  - Tremor
- Subjective Questionnaire

VISUAL DATA ANALYSIS

- Approximately one third of the sample needed bigger font size
- A few users also have colour blindness mainly Red-Green type

TECHNOLOGY EXPOSURE DATA ANALYSIS

- Most Indian users did not use smartphone or kiosks
- Most of them use mobile phone and TV though a few reported problems with small button size
- Most of them find Computers hard to remember and use
- They are interested to use computers to connect to their distant relatives
- A few of users would like to pursue their hobbies using computer

SUMMARY OF RESULTS

- Education level is more important than age with respect to cognition
- Age reduces hand strength in turn capability of using computer peripherals
- Bigger font size and buttons are good
- Elderly users will use it if it is interesting and easy-to-use

ITU – T FGAVA CASE STUDY

IDENTIFY PROBLEMS

- Mainstream products and services often ignore accessibility issues
- No way to map accessibility features to users' range of capabilities
- Quality of service and participation experience
- Lack of assistive products, services and scope of education in developing countries

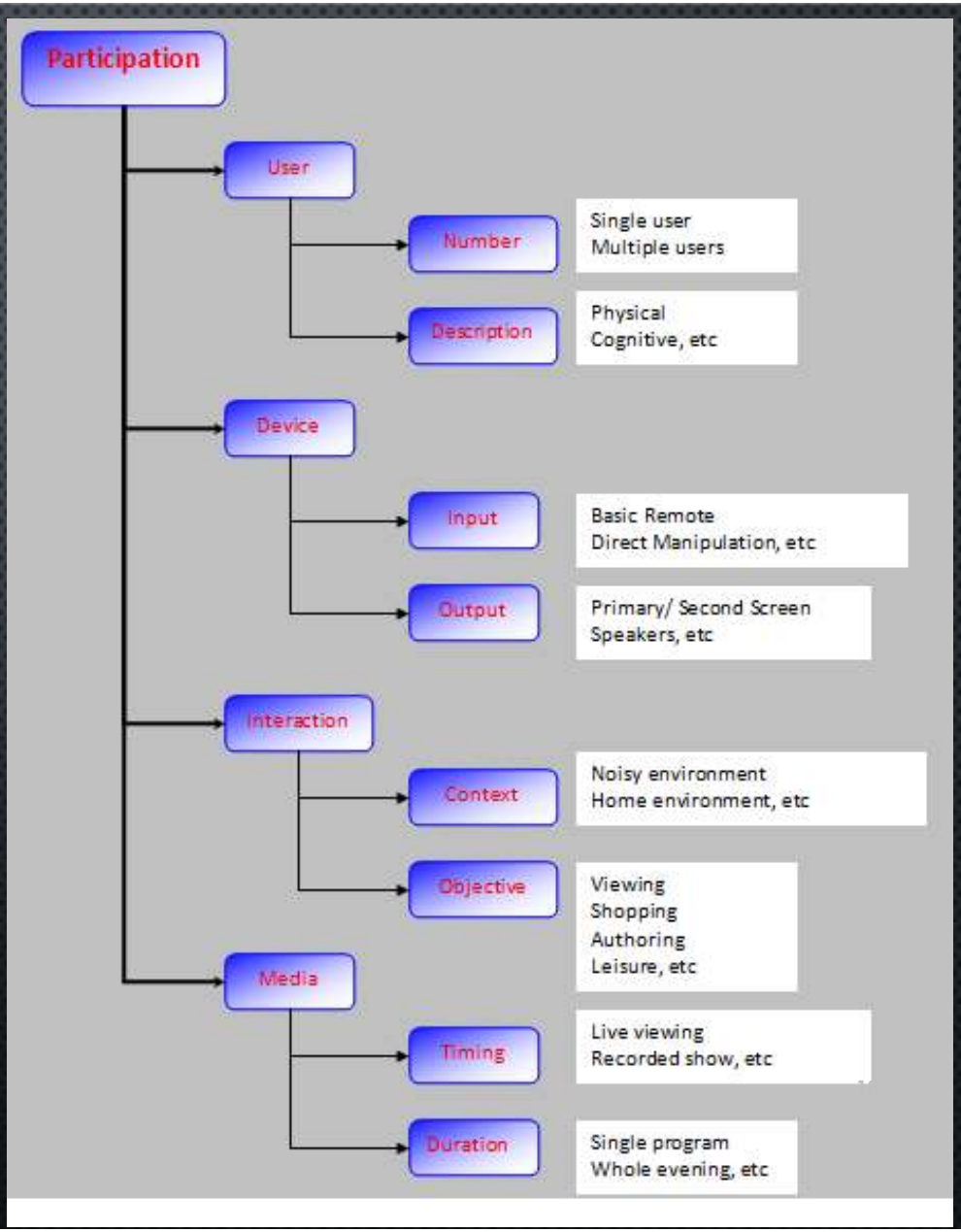
SET UP VISION

- All Audio visual media can be accessed by multiple modalities
- The media will be intelligent enough to choose the appropriate modality of interaction and accessibility service based on physical, mental and situational impairment of users
- Both the content and presentation of media can adapt itself based on context of use and change of range of abilities of users with progression of age or disease.
- Audio Visual content developers can
  - understand
  - visualize
  - measure effect of impairment on their design
- Each product will either serve different impairment or have specification about the assumed range of capabilities of users
- Audio Visual media will be seamlessly portable to different platforms and transmission media.

CONSOLIDATE CASE STUDIES

- VIEWER ALONE WATCHING NEWS IN HIS DRAWING ROOM
- VIEWER WATCHING A LIVE SHOW AND PARTICIPATING IN A VOTING PROCESS WITH MOBILE PHONE AND IMAGE RECOGNITION TECHNOLOGY
- VIEWER WATCHING A LIVE SHOW IN A CONNECTED TV AND SHOPPING OVER INTERNET USING DIRECT MANIPULATION WITH A GYROSCOPIC REMOTE
- VIEWER PLAYING A GAME IN A CONNECTED TV WITH AUGMENTED REALITY SYSTEM
- VIEWER USING A VIDEO CONFERENCING APPLICATION IN A HYBRID TV
- VIEWER DISCOVERING CONTENT IN A CONNECTED TV
- AND SO ON……..

PARTICIPATION TAXONOMY



USING THE TAXONOMY

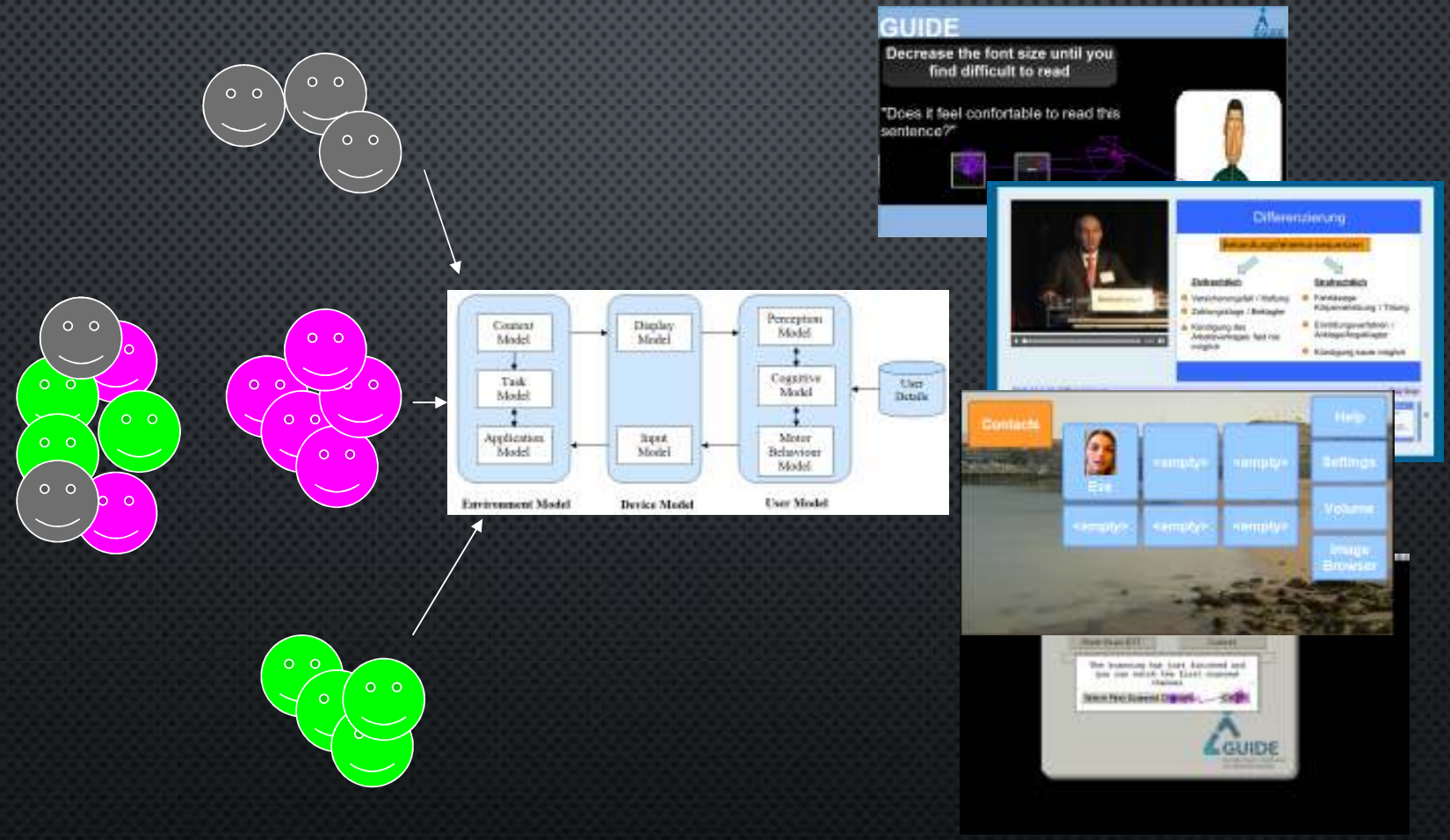
	Users	Device	Interaction	Media
Caption				
Audio caption				
Screen magnification				

COMMON USER PROFILE

USER PROFILING FORMAT

Variable name	Description	Data Type
Username	A unique id of user	String
Password	Log In credential	String
Age	Age of user in years	Integer
Sex	Sex of user	Integer
Height	Standing height of user	Integer
Volume	Preferred volume of speakers	Double
fontSize	Minimum font size of interface captions	Integer
fontColour	Preferred fore colour of buttons	String
cursorSize	Size of cursor	Double
cursorColour	Colour of cursor	String
Colour Blindness	Presence and type of colour blindness, used to predict colour contrast of interface	Integer
Tremor	Presence of Tremor or Spasm in hand	Integer

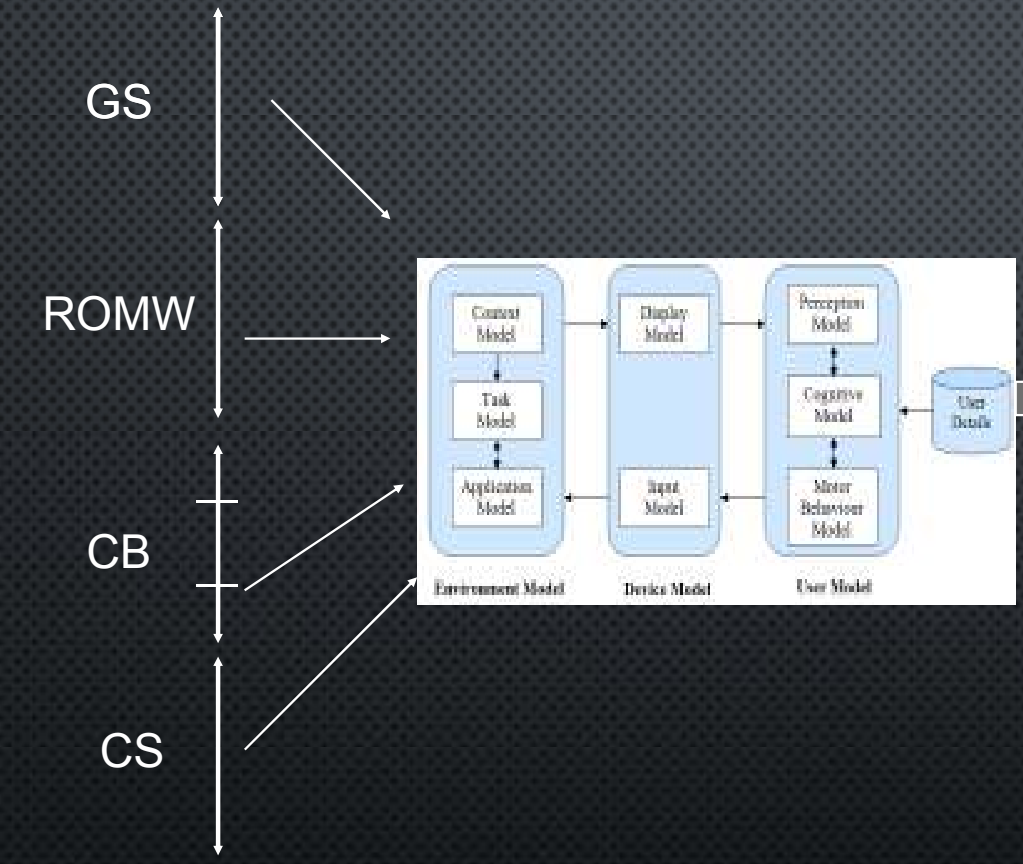
USER CENTRED DESIGN PROCESS

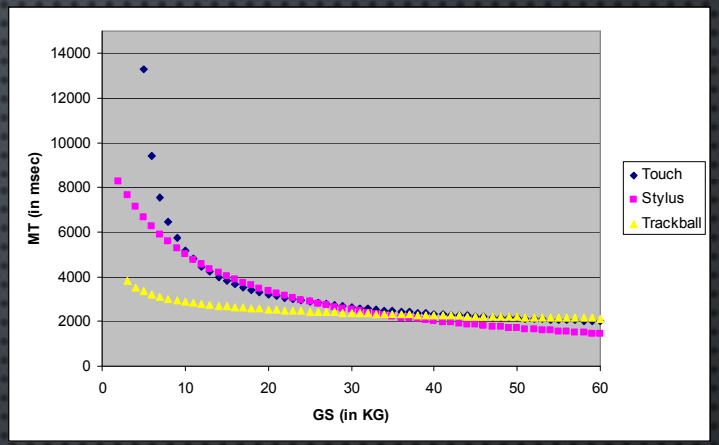


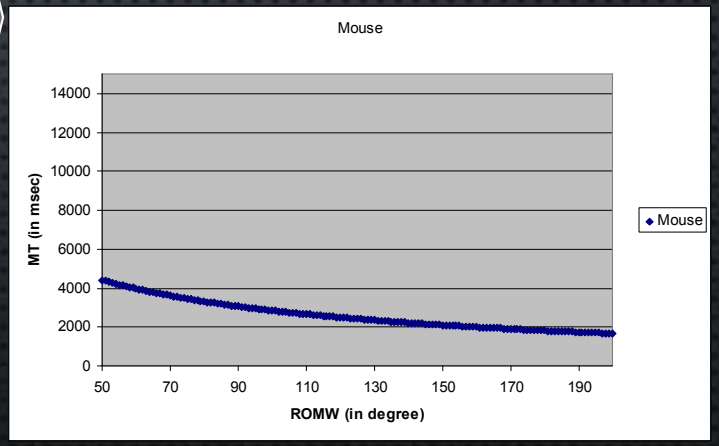
Users Clusters Simulation Optimized interfaces

SIMULATION EXAMPLE

USER MODELLING RULES





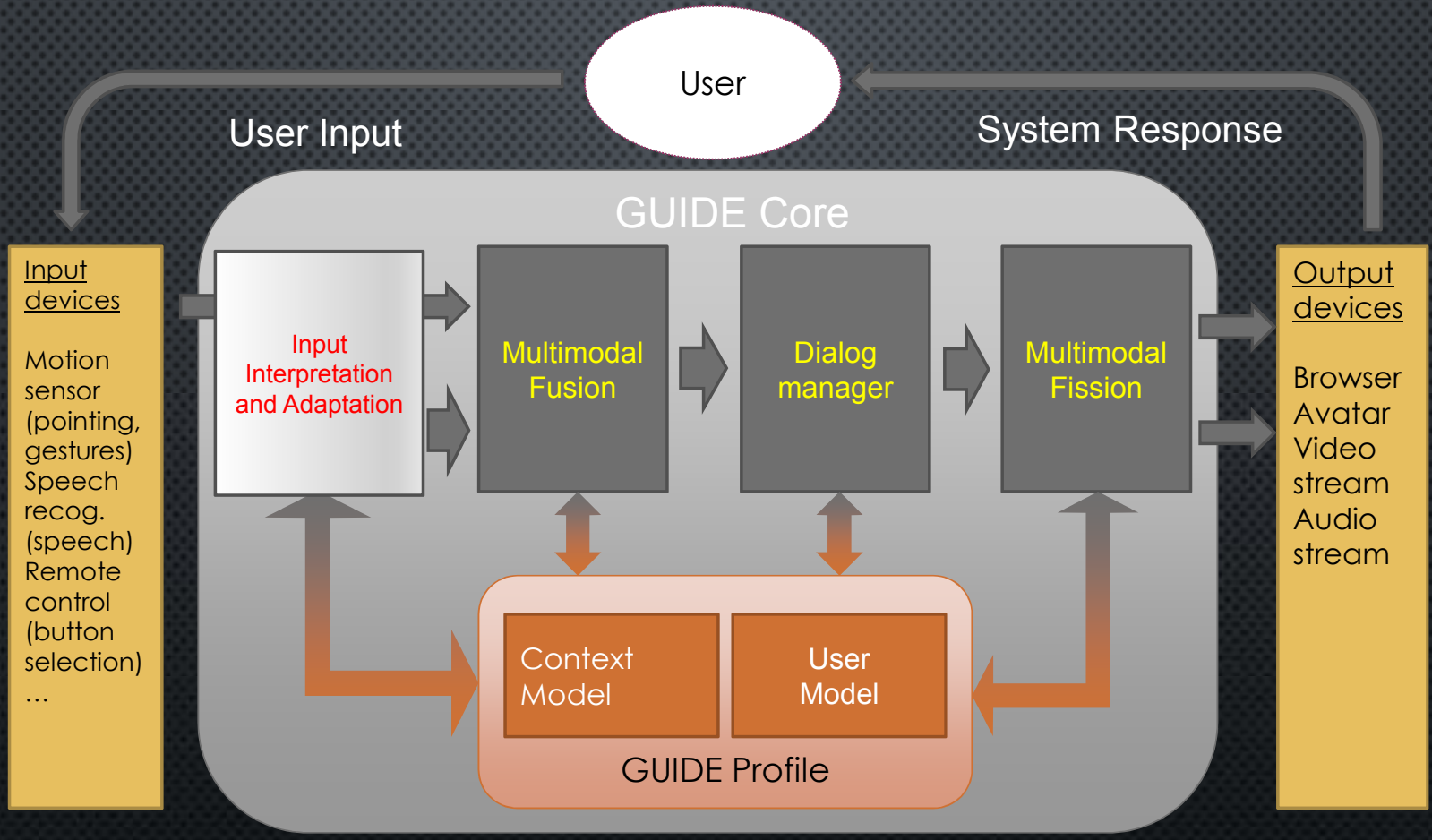


Range of User Parameters

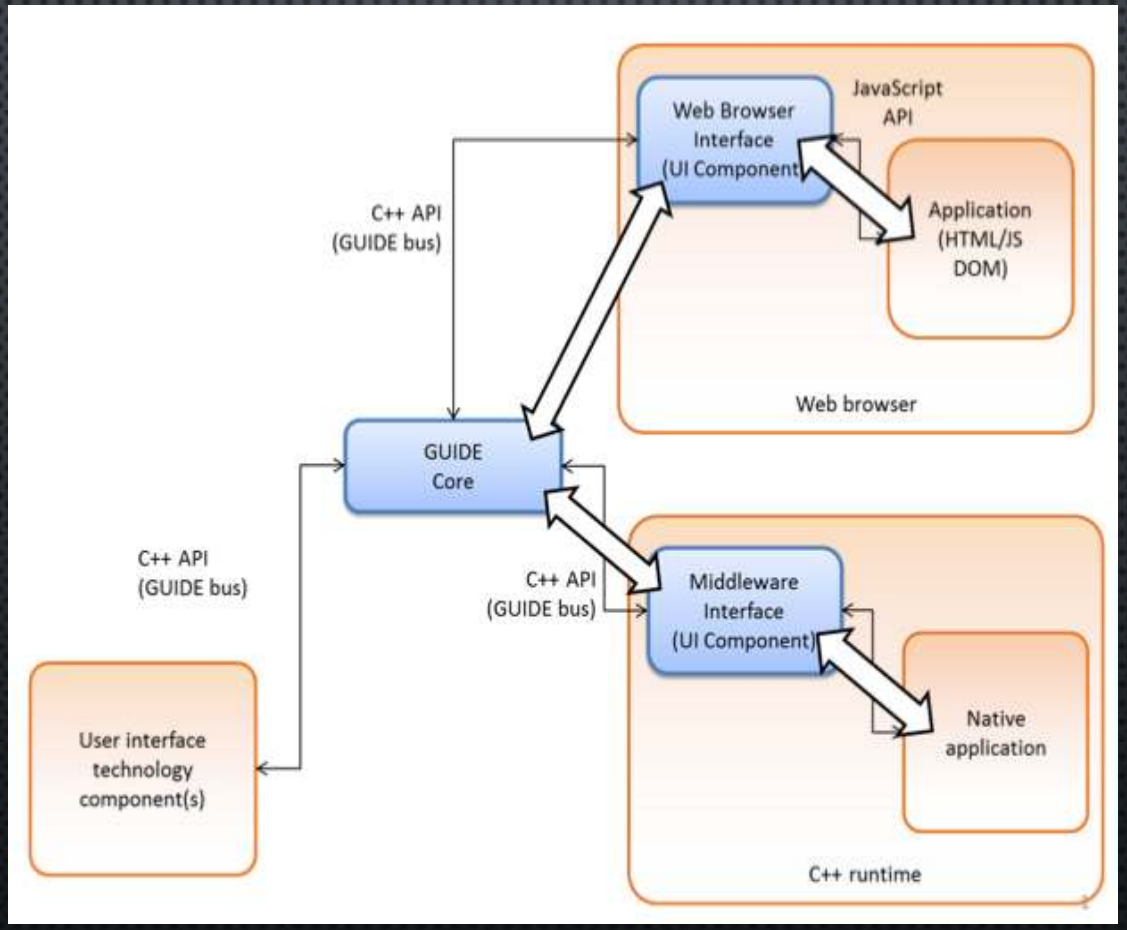
Simulation

Rules

DIGITAL TV FRAMEWORK – EU GUIDE



FRAMEWORK APPLICATION INTERFACE



CONCLUSIONS

- TV IS STILL MOST POPULAR AV MEDIA AMONG ELDERLY
- ACCESSIBLE TV SHOULD BE A MULTI-STAKEHOLDER APPROACH REQUIRING BOTH NEW RESEARCH AND QUALITY ASSURANCE OF EXISTING ACCESSIBILITY OPTIONS
- USER MODELLING IS A VIABLE APPROACH TOWARDS INCLUSIVE TV
- ACCESSIBLE DTV FRAMEWORK HAS ALREADY BEEN EXPLORED IN RESEARCH, NEEDS BLESSINGS OF INDUSTRY