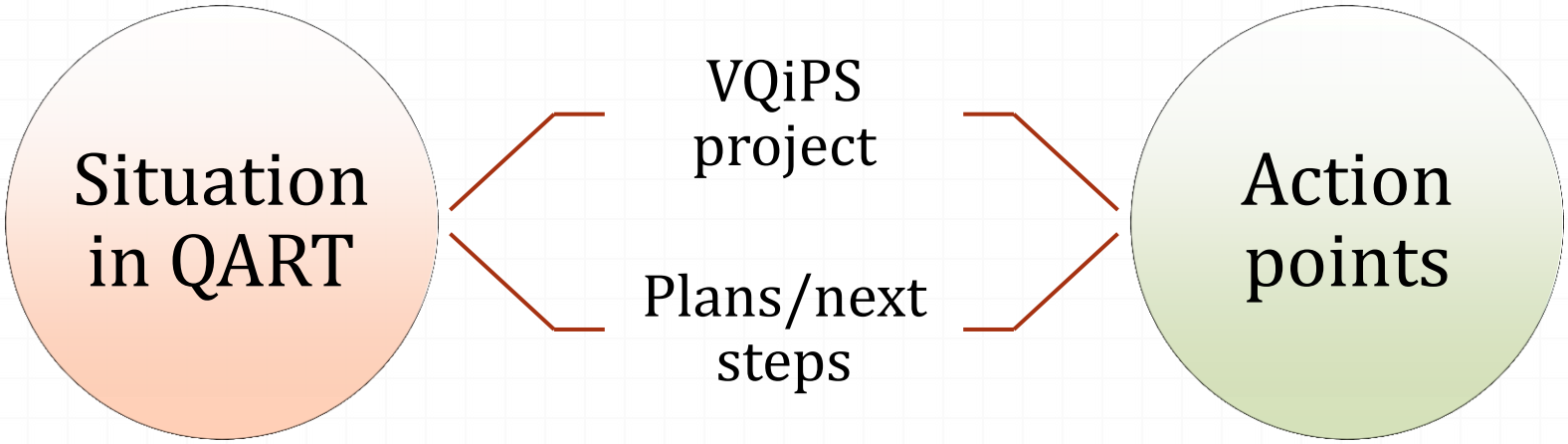
QART (Quality Assessment for Recognition Tasks)

Mikołaj Leszczuk, AGH (Poland)
Margaret Pinson, ITS-NTIA (USA)

Presentation plan



Situation in QART

QART motivation or why do we have different QoE for entertainment vs. recognition tasks?

240p,
24 BPP,
low bitrate:

- MOS: **good**
- LPR: **bad**

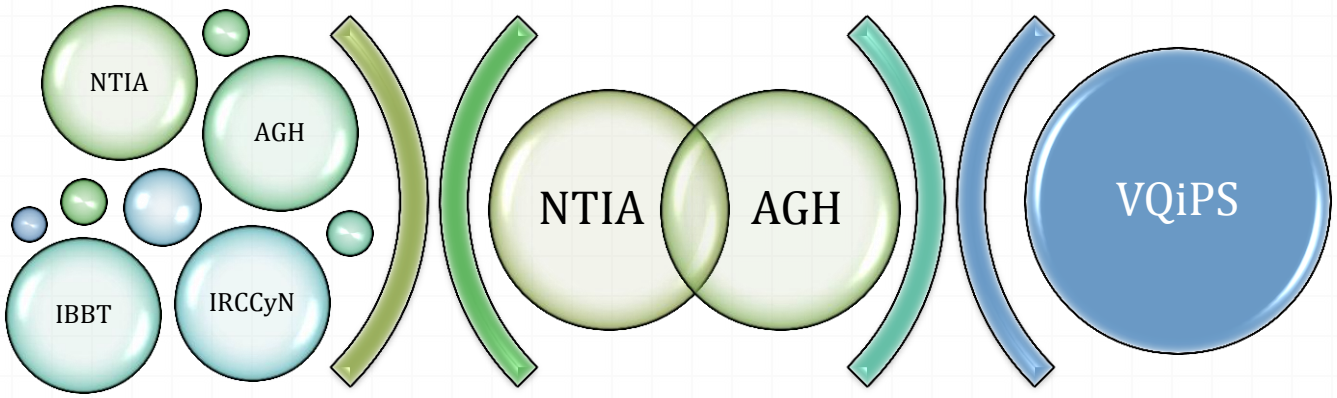
1080p HD,
24 BPP,
high bitrate:

- MOS: **excellent**
- LPR: **excellent**

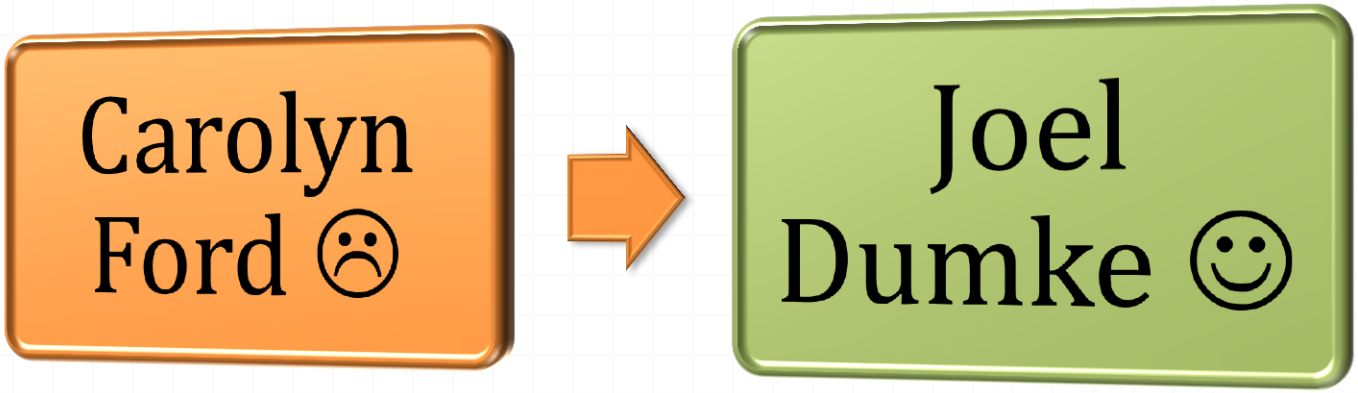
1080p HD,
1 BPP,
low bitrate:

- MOS: **bad**
- LPR: **excellent**

Organizations



Changes in QART co-chairmanship at ITS-NTIA



VQiPS project

Video Quality in Public Safety (VQiPS) Project

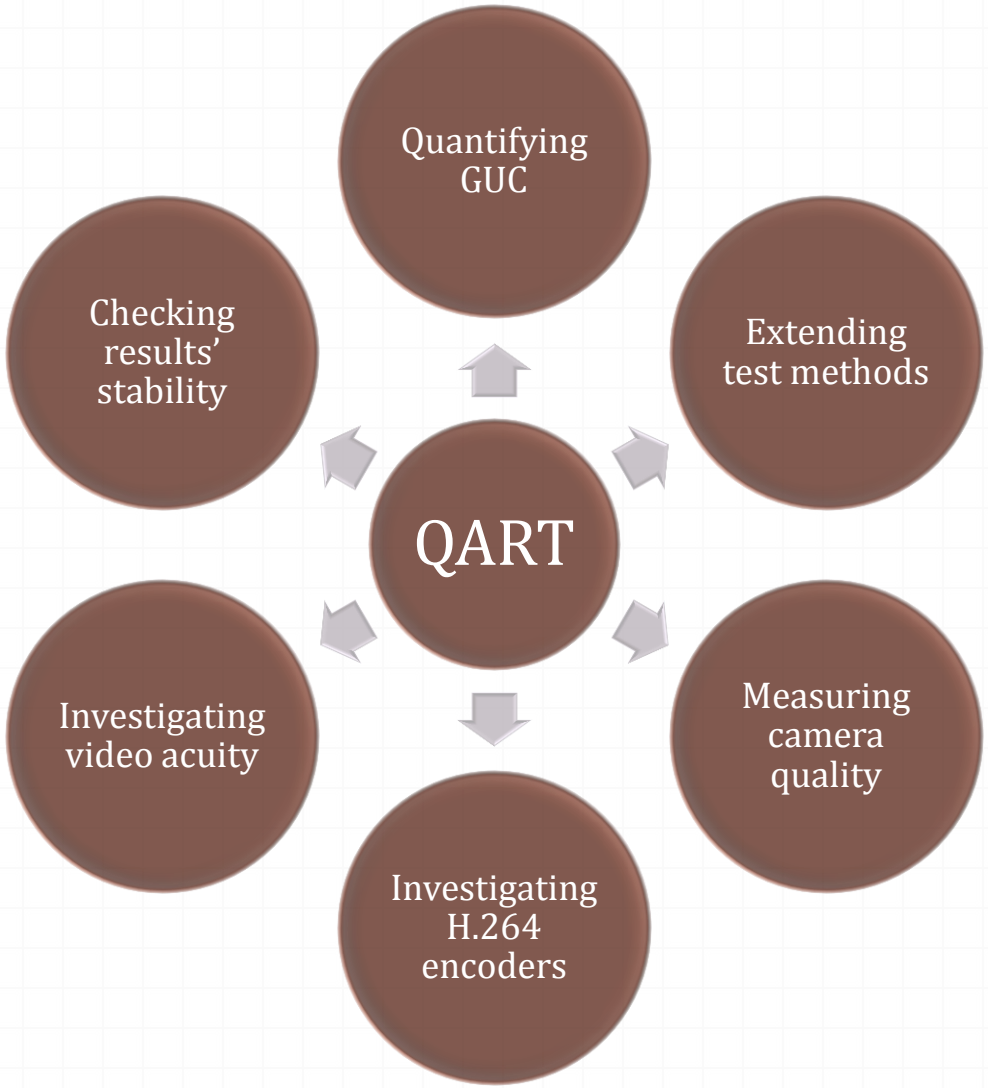
Office for Interoperability and Compatibility

Margaret Pinson's Slides

Plans/next steps

Where do we go from here?

Plans and proposals of joint research topics within the area of quality assessment for recognition tasks…



- Publications
- VQEG Reports
- Standardization

What we can achieve by this?

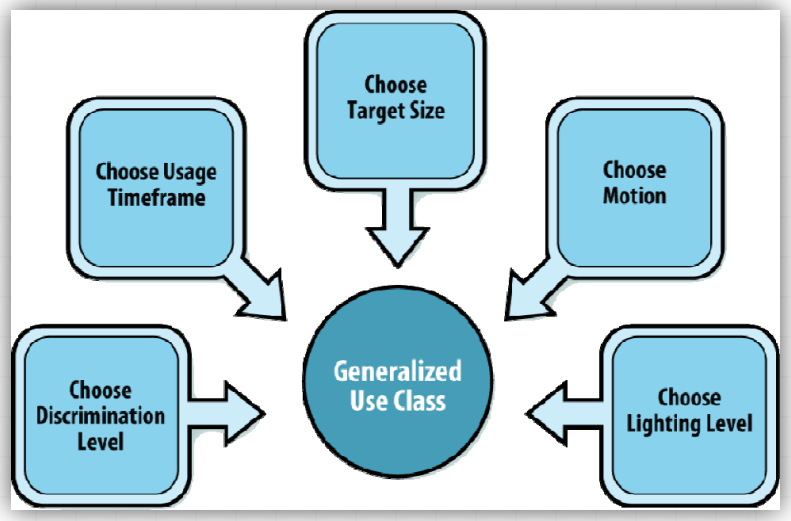
As usual in VQEG… ☺

Plans/next steps

Quantifying GUC

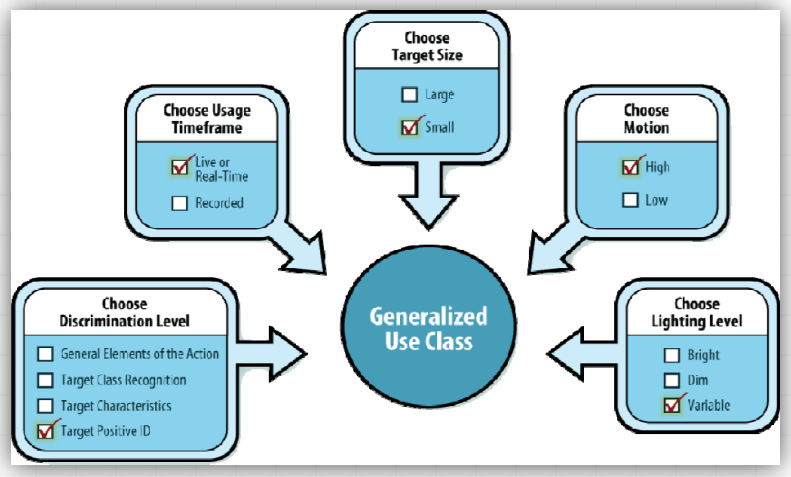
Quantifying GUC (Generalized Use Classes)

- Use Characteristics:
  - Discrimination Level
  - Usage Timeframe
- Scene content:
  - Target Size
  - Motion
  - Lighting Level



Quantifying GUC (Generalized Use Classes)

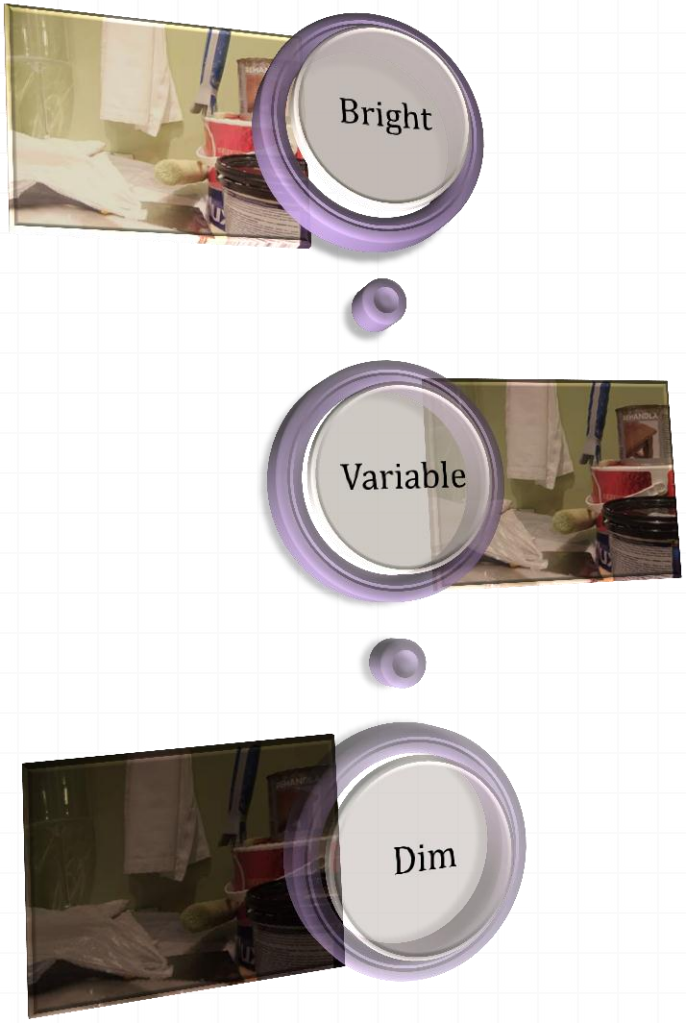
- Use Characteristics:
  - Discrimination Level
  - Usage Timeframe
- Scene content:
  - **Target Size**
  - **Motion**
  - **Lighting Level**



Main goals in quantifying GUC (Generalized Use Classes)

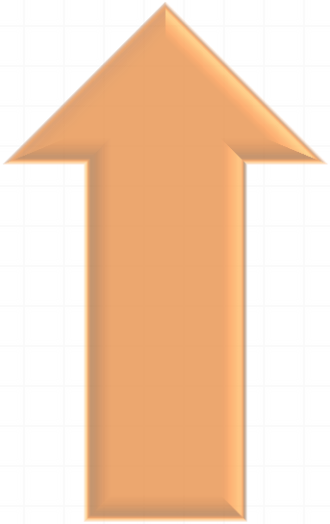
- Research on efficient algorithms that classify video sequences upon target size and lighting level
- Implementation of these algorithms
- Tests

Lighting levels measurement

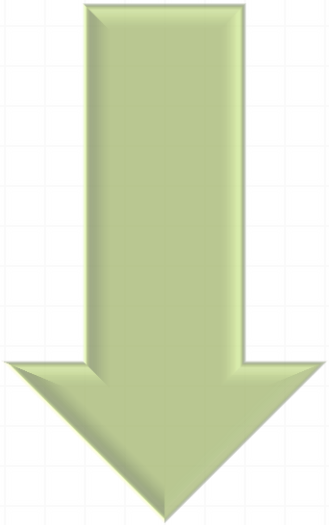


Motion levels measurement

Partly resolved (e.g. by Temporal Complexity models)



High Motion



Low Motion

Target size measurement

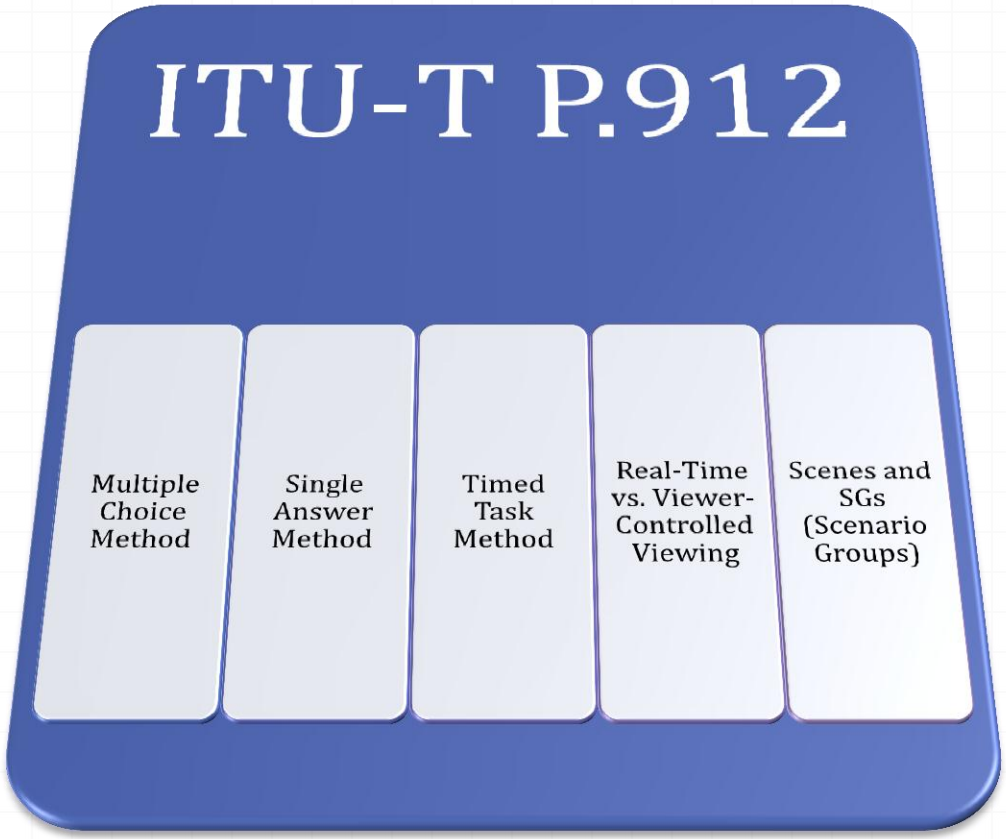
- Levels:
  - Large
  - Small
- Problems:
  - Target discrimination

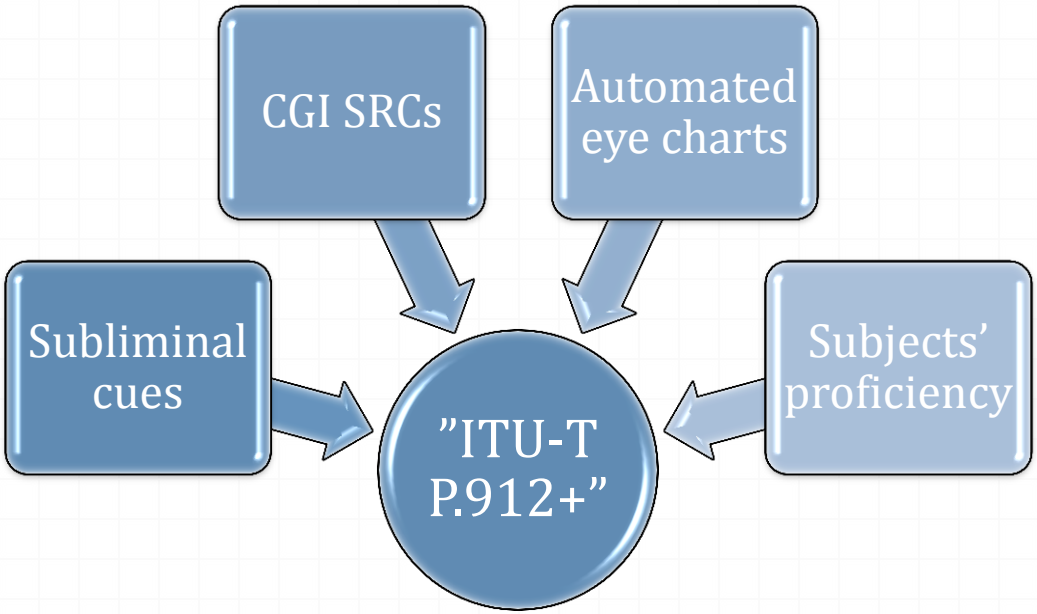
Plans/next steps

Extending test methods

Standardization of test methods and experimental designs

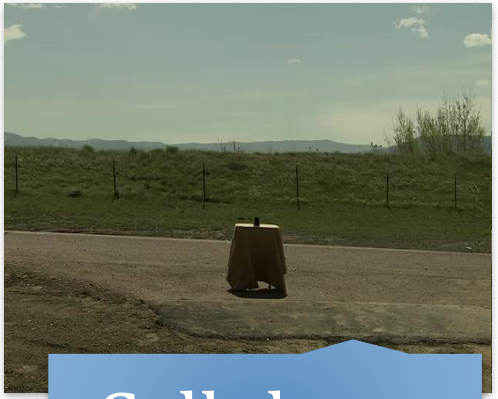
- ITU-T P.912:
  "QART-tish" for ITU-T P.910 ☺
- Some basics already defined there…
- …but there is still some large space for extension



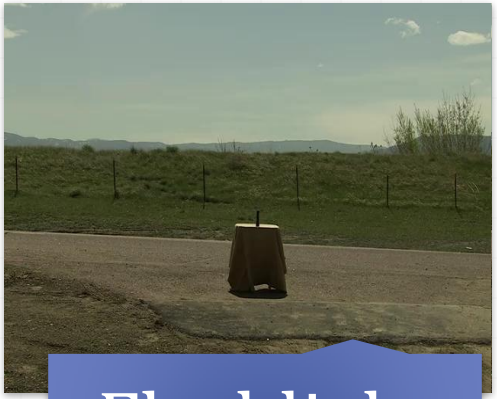


Plans/next steps for extending test methods and experimental designs

- Verifying requirements and refining methods/designs
- Making experiments both more accurate and feasible



Cellphone



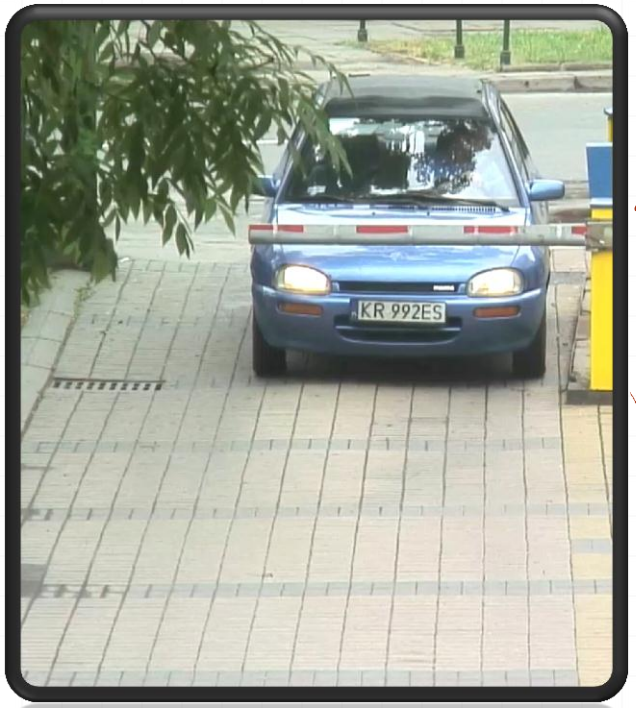
Flashlight

What is the impact of **subliminal cues**?

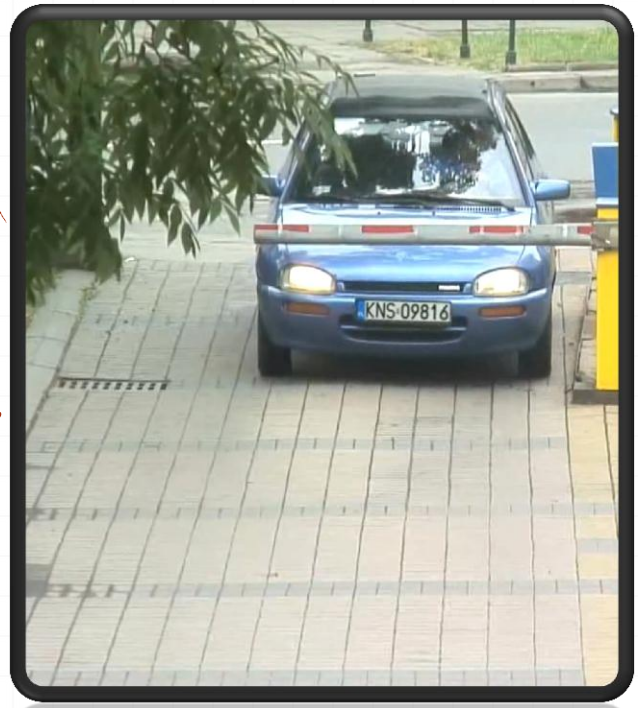
"Spot the difference ☺"! Recognizing objects…
…or just a different layouts of clouds?

Are **CGI (Computer Generated Imagery) SRCs** valid?

Shooting various SRCs is very tedious…

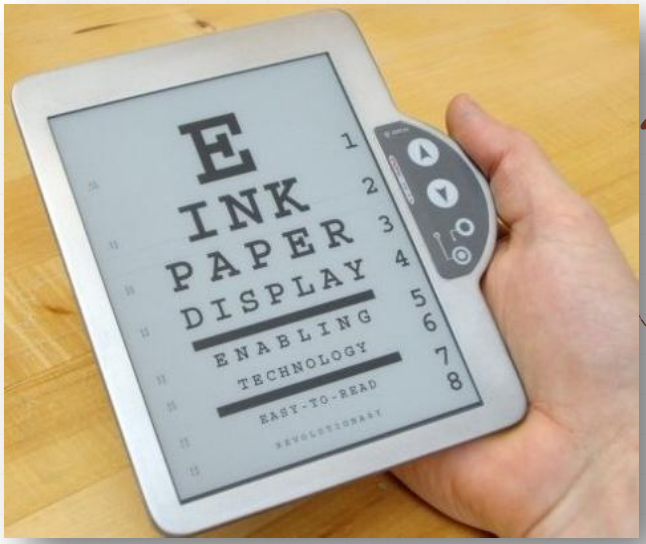


…so why not give overlaying realistic CGI a try?

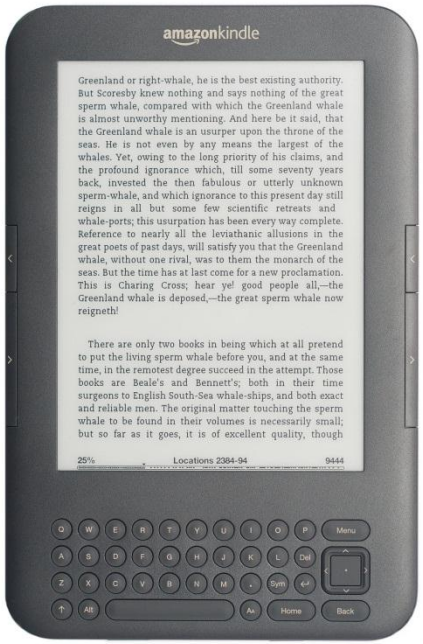


Can **automated eye charts** be used?

Considering passive e-ink to avoid print?



Could easily get ca. 10” passive e-ink display…



Expert subject

- Costly (practitioner):
  - Police officer
  - Doctor
- Difficult to hire

Non-expert subject

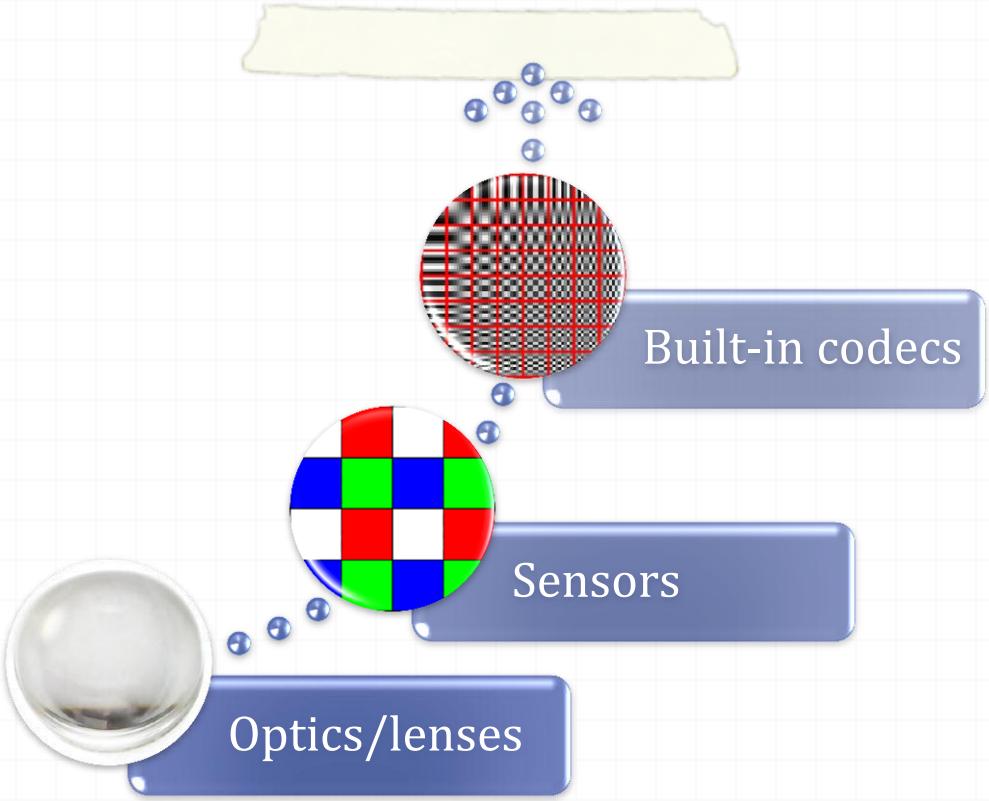
- Cheap (colleague/friend)
  - Student
  - Retired
- Easy to hire

Is **subjects' proficiency** necessary?

Do I really need to be a security officer in order to participate in a test checking my ability to read license plate numbers in compressed video?

Plans/next steps

Measuring camera quality



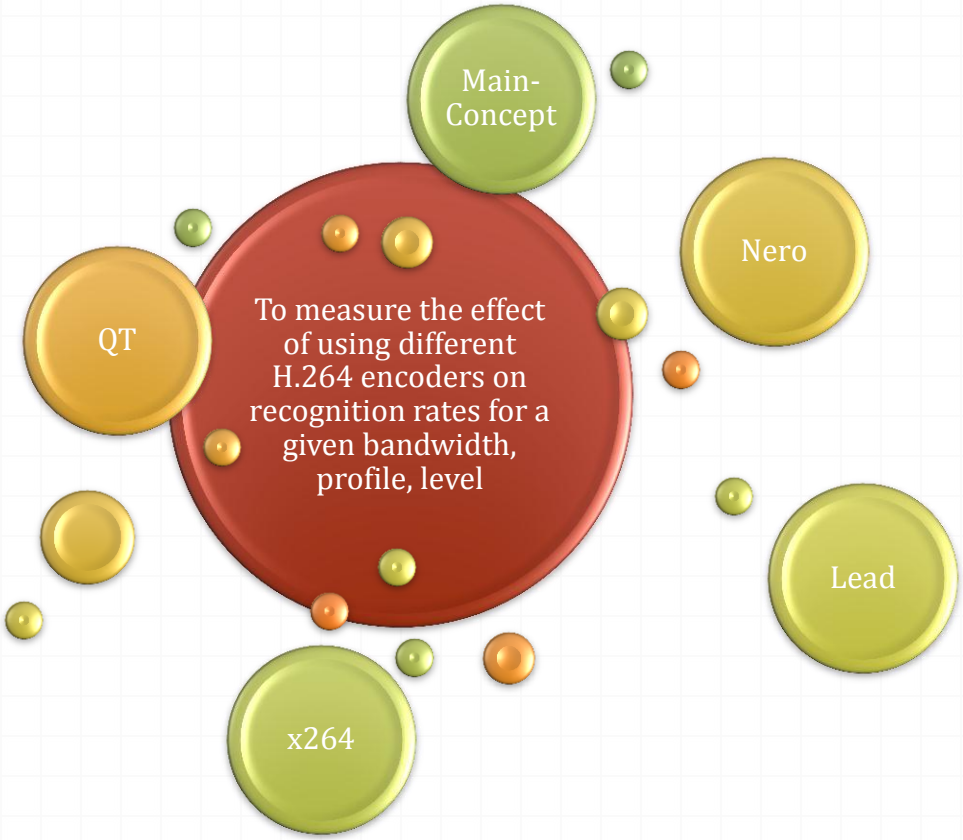
Measuring **source camera quality**

- Major loss of video quality happening before leaving camera
  - Research useful for non-QART projects as well

Plans/next steps

Investigating H.264 encoders

Investigating H.264 encoders

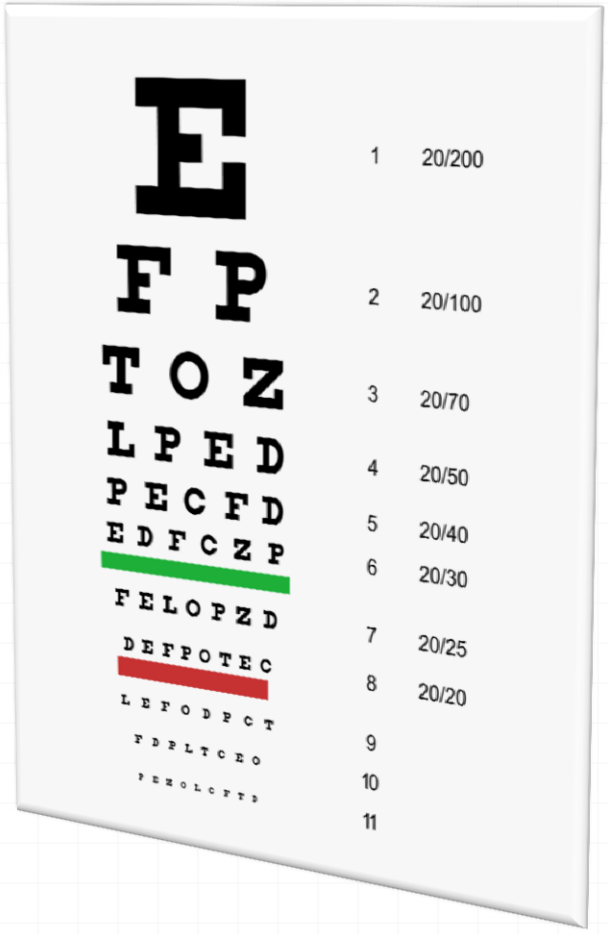


Plans/next steps

Investigating video acuity

Investigating video acuity

- Metric to quantify effective performance of video systems
- By *Andrew Watson, NASA Ames Research Center, USA*
- Based on eye charts
- Attempting to correlate acuity data to other metrics and results:
  - PSNR
  - SSIM
  - VQM



Plans/next steps

Checking results'stability

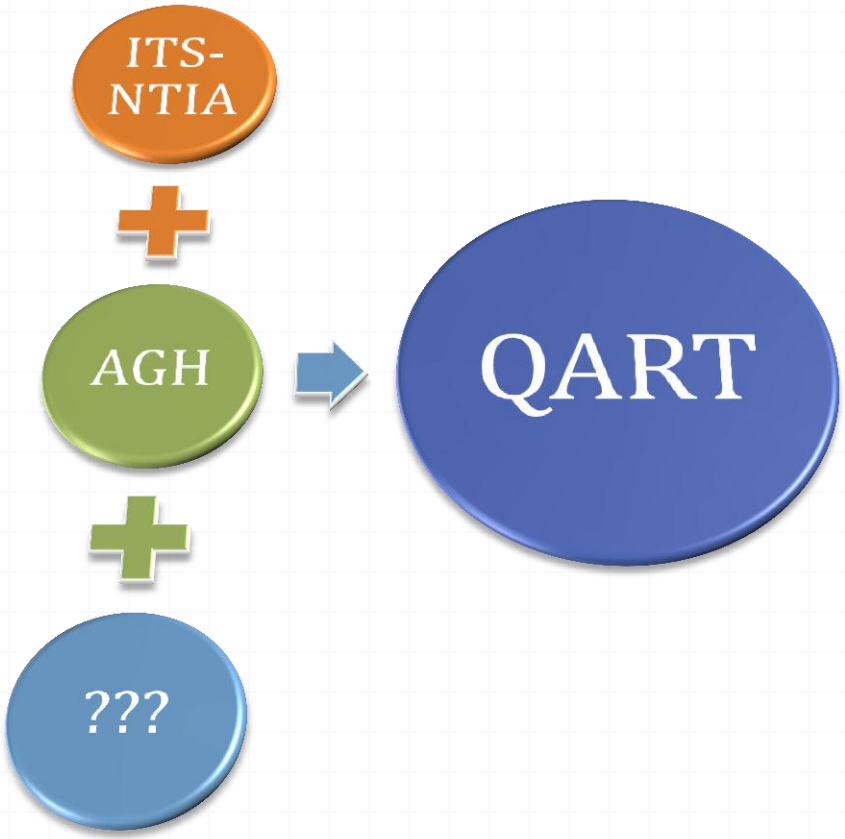
Checking results stability

- Checking across different laboratories
- Regular for other VQEG projects, not yet in QART
- Checking with different:
  - Cameras
  - User interfaces
  - Objects to be recognized
- Results within Generalized Used Class should be identical

Action points

Stakeholders – who is in?

- Sharing ideas
- Joint experiments
- Joint papers
- Joint VQEG reports
- Joint standardization contributions



Discussion

Acknowledgments:

- ITS-NTIA: The Public Safety Video Quality (PSVQ) project is undertaken by the Public Safety Communications Research (PSCR) program, sponsored by the U.S. Department of Homeland Security's Office of Interoperability and Compatibility
- AGH: The "Intelligent information system supporting observation, searching and detection for security of citizens in urban environment" (INDECT) project is undertaken by the Seventh Framework Program, sponsored by the European Commission (Grant No. 218086)