



**ITS**

Institute for Telecommunication Sciences  
Boulder, Colorado



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# Progress and Future Plans for VQEG

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Arthur Webster

U.S. Department of Commerce, NTIA  
Institute for Telecommunication Sciences  
([webster@its.bldrdoc.gov](mailto:webster@its.bldrdoc.gov))

ETSI STQ Workshop

“Effect of transmission performance on Multimedia Quality of Service”  
17-19 June 2008 - Prague, Czech Republic

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# From Turin to Kyoto 1997 - 2008

- First VQEG meeting in Turin, Italy 1997



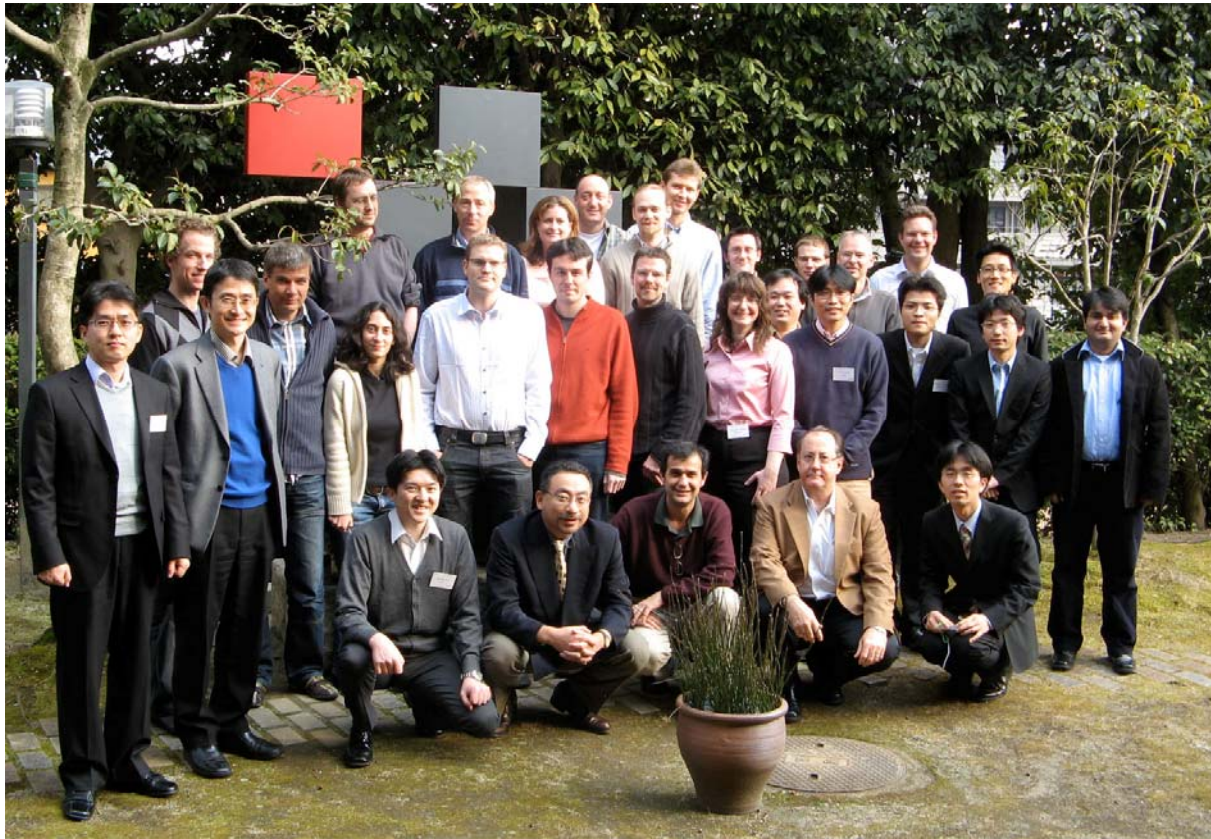
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⇒ Participants from ITU-T SG12, SG9, ITU-R WP11E

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# From Turin to Kyoto 1997 - 2008

- Most recent meeting in Kyoto, Japan 2008



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⇒ Current focus is on Hybrid Methods, Multimedia, HDTV

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# Video Quality Expert's Group (VQEG)

- Founded 1997
  - ITU-T SG 12, SG 9, and ITU-R 11E (now 6G) video experts
  - Website ( [www.vqeg.org](http://www.vqeg.org) )
  - FTP server ( <ftp://vqeg.its.bldrdoc.gov/> )
- Primary mission
  - Validate objective video/multimedia quality metrics
  - Report results to ITU and other standards organizations
  - VQEG does not develop or publish standards
    - Conducts tests and reports results
    - Provides expertise on video/multimedia quality
- VQEG's Independent Lab Group (ILG) oversees and conducts tests
  - Combines resources of laboratory organizations worldwide
  - ILG members are not technology proponents in the same test

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⇒ International — focus on video/multimedia quality

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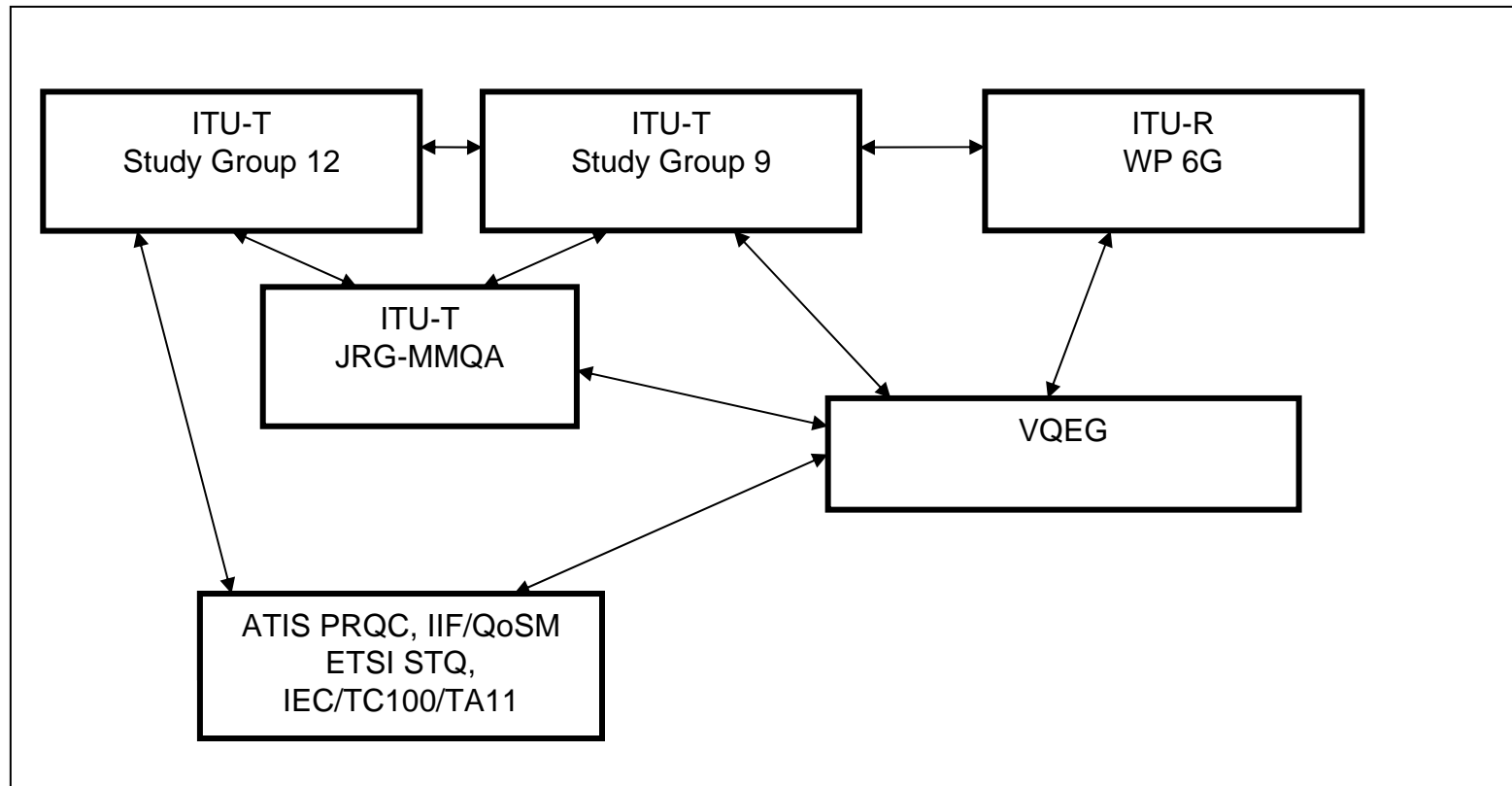
# Characteristics of VQEG

- Unofficial, with links to several standards organizations
- Technical group, open to all
- No dues, no staff, all volunteer effort
- 650 email accounts on the main VQEG email list
- Physical meetings have 20 to 40 participants
- Advantages and disadvantages
  - Documents and information open to all
  - Dependence upon volunteers to do all the work
  - Participants from industry, academia, government labs, and standards organizations

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⇒ Liaisons with ITU-T, ATIS, IEC, ETSI STQ

# Organizations Studying Objective Methods for Video/Multimedia Quality Assessment



⇒ VQEG brings together SDOs, academia, industry

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# VQEG's Board

<b>Name</b>	<b>Organizatoin</b>	<b>Position</b>
Arthur Webster	NTIA/ITS	VQEG Co-Chair
Filippo Speranza	CRC	VQEG Co-Chair
Kjell Brunnstrom	Acreo	ILG Co-Chair
Greg Cermak	Verizon	ILG Co-Chair
Alex Bourret	British Telecom	RRNR-TV Co-Chair
Chulhee Lee	Yonsei University	RRNR-TV Co-Chair
Kjell Brunnstrom	Acreo	Multimedia Co-Chair
David Hands	British Telecom	Multimedia Co-Chair
Vittorio Baroncini	FUB	HDTV Co-Chair
Phil Corriveau	INTEL	HDTV Co-Chair
Margaret Pinson	NTIA/ITS	HDTV Co-Chair
Ricardo Pastrana	France Telecom	Tools and Subjective Labs Setup Co-Chair
Patrick Le Callet	IRCCyN	Tools and Subjective Labs Setup Co-Chair
Yves Dhondt	Ghent University	Tools and Subjective Labs Setup Co-Chair
Chulhee Lee	Yonsei University	Hybrid Perceptual/Bitstream Co-Chair
Jens Berger	SwissQual	Hybrid Perceptual/Bitstream Co-Chair
Patrick Le Callet	IRCCyN	Joint Effort Group Co-Chair
Alex Bourret	British Telecom	Joint Effort Group Co-Chair

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⇒ Co-Chairs Coordinate areas of work in VQEG

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## Types of Objective Video Quality Assessment Methods (ITU-T Recommendation J.143)

- Full Reference (FR)
  - Full access to source video
  - Accurate but not as useful for in-service
  - Scene and technology independent
- Reduced Reference (RR)
  - Compares low bandwidth quality features from SRC & PVS streams
  - In-service monitoring
  - Scene and technology independent
  - Often as accurate as FR, degrades gracefully as RR BW is reduced
- No Reference (NR)
  - Access to source video not needed
  - In-service but not as accurate
  - Not scene or technology independent

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⇒ Each type has valid applications and strong proponents



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# Full Reference TV (FRTV) Phase 1

- From 1997 to 2000
  - 8 subjective Labs, 10 objective proponents
  - 20 source sequences (split 525 & 625)
  - 32 video systems
  - Results:
    - No clear “winner”
    - Recommendation **ITU-T J.144** (March 2001)
      - 8 methods documented in non-normative appendices
    - VQEG FRTV Phase I Report
  - Huge database publicly available for research
    - 20 source (3.5G) 320 processed sequences (54.5G)
    - Subjective ratings
  - See: Objective Perceptual Assessment of Video Quality: Full Reference Television
    - [http://www.itu.int/ITU-T/studygroups/com09/docs/tutorial\\_opavc.pdf](http://www.itu.int/ITU-T/studygroups/com09/docs/tutorial_opavc.pdf)
    - (Documents from FRTV Phase I and Phase II)
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# Full Reference TV (FRTV) Phase 2

- From 2000 to 2004
  - 3 subjective Labs, 8 objective Proponents (2 withdrew)
  - 26 source sequences (split 525 & 625)
  - 24 video systems
  - Results:
    - Four models did better than PSNR for both 525 and 625:
      - NTIA/ITS (USA)
      - British Telecom (UK)
      - Yonsei University / SK Telecom (Korea)
      - CPqD (Brazil)
    - These four are normative models included in Recommendations:
      - **ITU-T J.144 2004** (ITU-T SG9)
      - **ITU-R BT.1683 2004** (ITU-R SG6)
  - Video database not available to the public
    - Many sequences restricted
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# Multimedia Test Phase I (video only)

- Active from 2004 to 2008
  - 5 proponents, 10 independent test labs, 7 other subjective test labs
  - 41 subjective tests (completed March 2008)
    - 386 source video clips (VGA, CIF, QCIF)
    - 5320 processed sequences
    - Evaluated by 984 viewers
  - Results:
    - Four normative models are included in Draft Recommendation
      - **ITU-T J.mmvofr** (Full Reference) (SG9 will launch AAP LC in July)
        - Psytechnics
        - Opticom
        - Yonsei University
        - NTT
    - One proponent's models included in Draft Recommendation:
      - **ITU-T J.mmredref** (Reduced Reference) (SG9 will launch AAP LC in July)
        - Yonsei University
  - Video database not available to the public
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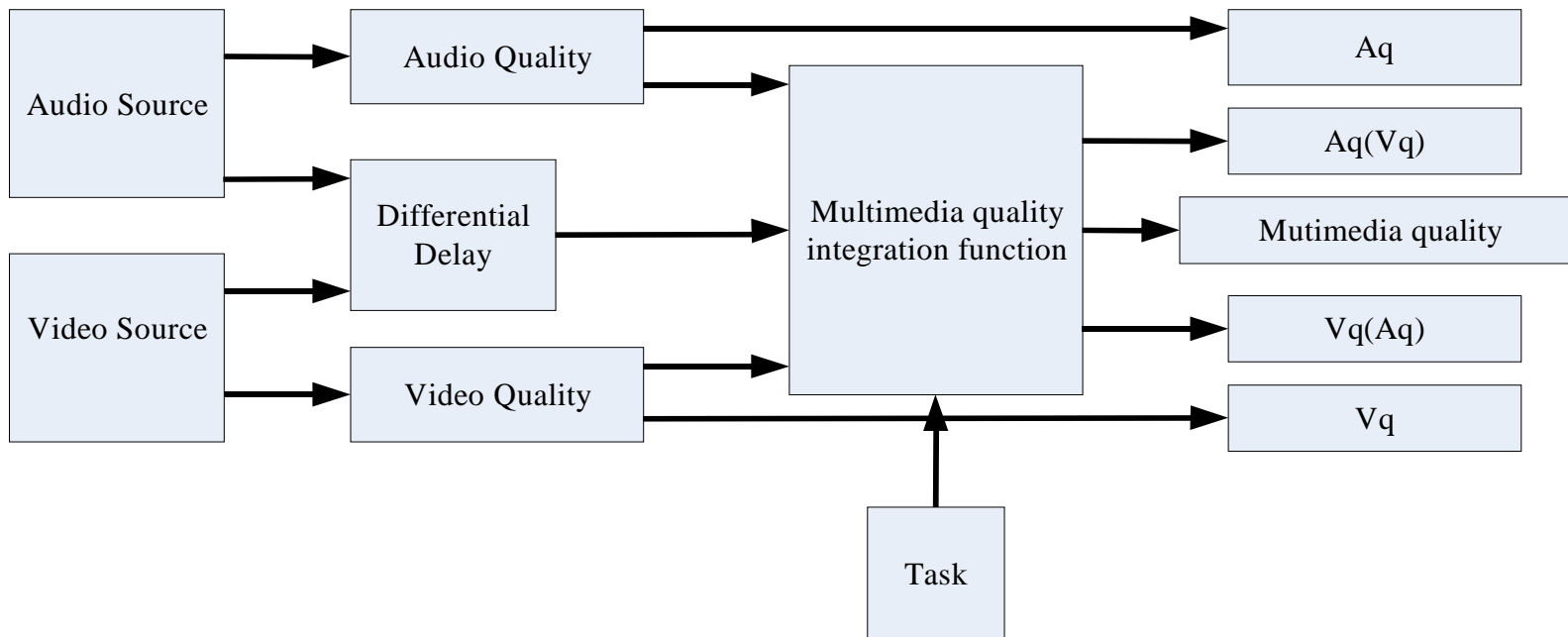
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# Joint Rapporteur Group on Multimedia Quality Assessment (JRG-MMQA)

- Founded 2004
  - Between ITU-T SG9 and SG12
  - Multimedia has both audio and video
    - Audio and network experts from ITU-T SG12
    - Video experts from ITU-T SG9
    - Many meetings have been held— usually as part of VQEG meetings
  - Multimedia Phase II will have audio and video
  - Hybrid may have audio as well as video
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# Multimedia Quality Standards

- From **ITU-T J.148**: “Requirements for an objective perceptual multimedia quality model”



⇒ Framework for ongoing VQEG multimedia testing

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# Representative (Current) ITU Projects

## ITU-T SG 9

- J.mmvofr – AAP Last Call July 2008
- J.mmredref – AAP Last Call July 2008
- J.redref (SDTV – reduced reference) – late 2008
- J.mmnoref (MM no reference) – late 2008?
- J.noref (SDTV – no reference) – late 2008?
- Recs based on HDTV tests – 2009
- Recs based on hybrid bitstream / perceptual tests – late 2009

## ITU-T SG 12

- G.1050 (IP/MM transmission performance model)
- G.OMVAS (Quality planning model for IPTV)
- P.NAMS (Quality monitoring model for IPTV)

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⇒ Complementary work is being done in ITU-R SG 6

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# RRNR-TV Test

- Begun 2000; restarted 2005
    - May finish by September 2008
  - Test plan: [ftp://vqeg.its.bldrdoc.gov/Documents/Projects/rrnr-tv/RRNR-tv\\_draft\\_2.1\\_changes\\_highlighted.doc](ftp://vqeg.its.bldrdoc.gov/Documents/Projects/rrnr-tv/RRNR-tv_draft_2.1_changes_highlighted.doc)
  - 4 proponents,
  - 2 subjective tests
    - 24 source video clips (525-line, 625-line)
    - ~296 processed sequences
    - Evaluated by 48 viewers
  - Results:
    - Recommendation possible by September 2008
  - Video database not available to the public.
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# HDTV Test

- Begun 2004; due to finish mid 2009
  - Test plan:  
[ftp://vqeg.its.bldrdoc.gov/Documents/Projects/hdtv/VQEG\\_HDTV\\_testplan\\_v2\\_0.doc](ftp://vqeg.its.bldrdoc.gov/Documents/Projects/hdtv/VQEG_HDTV_testplan_v2_0.doc)
  - ~7 proponents,
  - ~7 subjective tests (1 per proponent, maybe ILG)
    - 9 source video clips (1080i) per proponent
    - 153 processed sequences per proponent
    - Evaluated by 24 viewers per test
  - Results:
    - Expected by late 2009
  - Video database probably not available to the public.
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# Hybrid Perceptual/Bitstream Test

- Begun 2006; could finish late 2009
  - Test plan:  
[ftp://vqeg.its.bldrdoc.gov/Documents/Projects/hybrid/VQEG\\_hybrid\\_testplan\\_v1.1a.doc](ftp://vqeg.its.bldrdoc.gov/Documents/Projects/hybrid/VQEG_hybrid_testplan_v1.1a.doc)
  - Early stages, much interest, not much work done yet
  - Results:
    - Expected by September 2009
  - Video database not determined
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# Multimedia Phase II Test

- Not started, probably will begin September 2008
  - Test plan: None
  - Early stages, much interest, not much happening yet
  - Results:
    - Expected by September 2010
  - Audio/Video database not determined
  - Possible that current standardized models for audio and video quality assessment will be used
    - May only need a combining function for audiovisual quality.
    - Still will require a validation test
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# VQEG Timeline and Future Activities

3D?

Multimedia - II

Multimedia - I : Video Only

Multimedia - II : Video & Audio

HYBRID

HDTV

QCIF

Multimedia - I

CIF

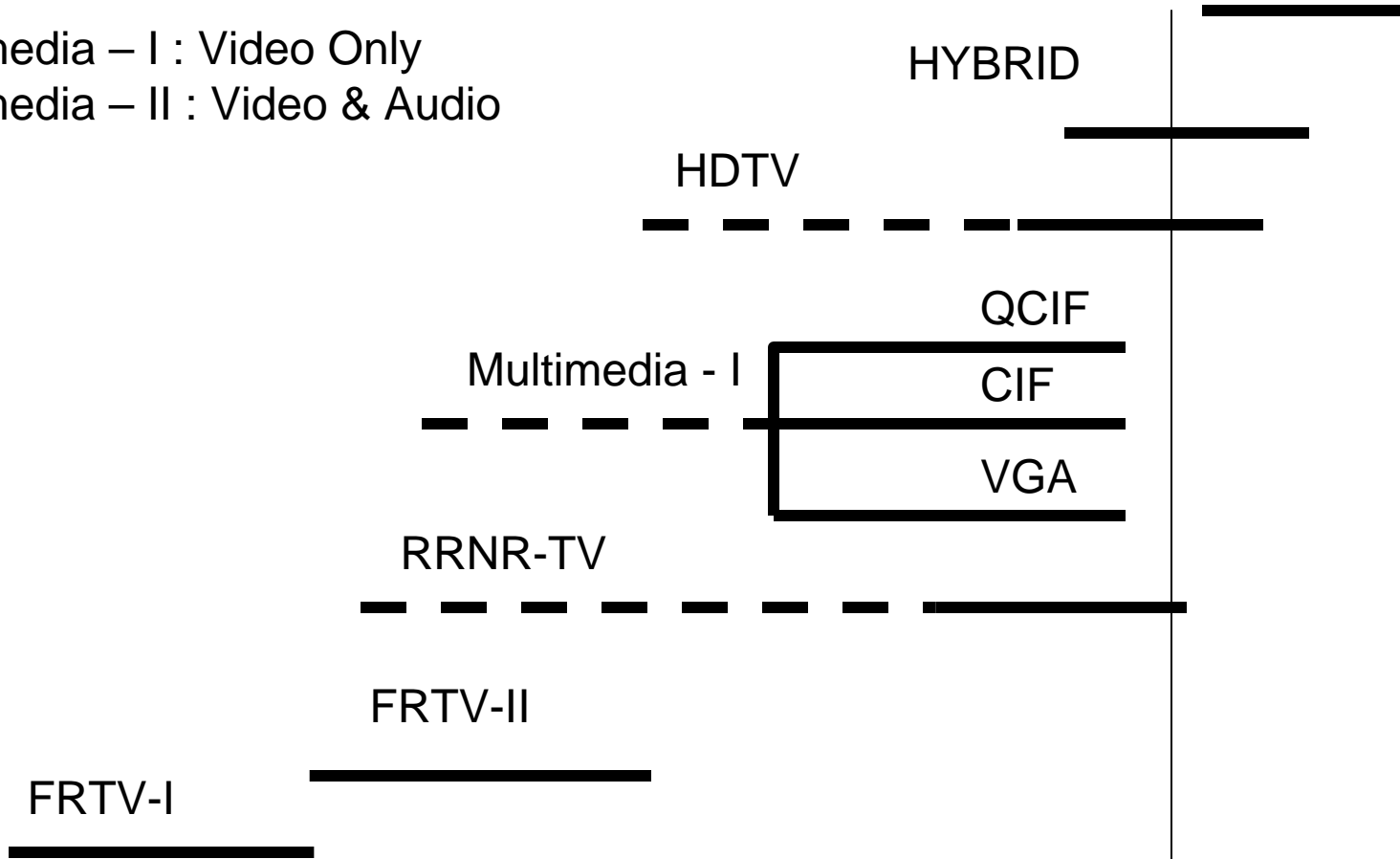
VGA

RRNR-TV

FRTV-II

FRTV-I

1996 1997 1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011



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## Other VQEG Efforts

- Tools and Subjective Labs Setup Group
  - Collects, develops, or locates quality assessment software tools
  - Makes them available on VQEG ftpsite
    - Prefer freeware be contributed
  - Provides info for
    - Subjective lab setup
    - Lab equipment (monitors, etc.)
- Joint Effort Group
  - New group, started 2007
  - Goal to jointly develop quality assessment models
    - Combine the best parts of models

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⇒ Joint Development of models very attractive

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## Summary

- VQEG combines expertise of academia, industry, government labs, and SDOs
- Conducts tests and reports results to SDOs and email list
- Major projects completed:
  - FRTV-I, FRTV-II, MM-I
- Current and Future Projects:
  - RRNR-TV, HDTV, Hybrid, MM-II
- Joint development effort:
  - Potentially wider participation
  - Possibly better models

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⇒ Future solutions will require coordination among SDOs