Portable Data for Imaging - PDI

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IHE Radiology Technical Committee

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What IHE Delivers

PDI – The Landscape

- **Film is dead**

- **Ordering physicians need electronic replacement for film**

- **Transfer and referral of patients to other physicians and facilities need electronic replacement for film**

- **Cross-enterprise network sharing is not here yet**

- **The most widespread media choice is CD**

PDI -The Problems

- **In the film world, looking at images was easy; in the digital world, this has been complicated**

  - ➢ Can I read the CD ?

  - ➢ Can I view the images ?

  - ➢ Can I import the images ?

PDI – The Problems

- **Barriers to viewing**

  - On-board viewer may not execute, or not be adequate, or not be familiar to user
  - Non-standard or poorly implemented standard media may fail to be readable by previously installed viewer

- **Barriers to import**

  - Non-standard media, incorrectly implemented standards
  - Difficulty of reconciling different patient identifiers

PDI – The Solution

- **PDI goal**
  - ➢ is to increase the chances that the contents of the CD can be viewed and imported
- **Single solution**
  - ➢ for both viewing and import use cases
  - ➢ because sender can't anticipate recipient's needs
- **Standards-based solution**
  - ➢ existing DICOM standard CD is the basis of PDI
  - ➢ PDI adds constraints to maximize the chances
  - ➢ PDI adds features to support easier access

PDI – The Solution

- **PDI add constraints**
  - ➢ Only uncompressed images
  - ➢ Only CD media
  - ➢ Some restrictions on layout
- **PDI adds features**
  - ➢ Explanatory text files
  - ➢ Security good practices
  - ➢ Optional executable on-board viewer
  - ➢ Optional "web content", viewable in browser
  - ➢ Physical labeling recommendations

PDI – The Solution

- The importance of a statement by the American Medical Association Expert Panel on Medical Imaging:

"All medical imaging data distributed should be a <u>complete </u>set of images of <u>diagnostic quality </u>in compliance with <u>IHE-PDI</u>."

- The panel emphasized that:

"This standard will engender safe, timely, appropriate, effective, and efficient care; mitigate delayed care and confusion; enhance care coordination and communication across settings of care; decrease waste and costs; and, importantly, improve patient and physician satisfaction with the medical imaging process."
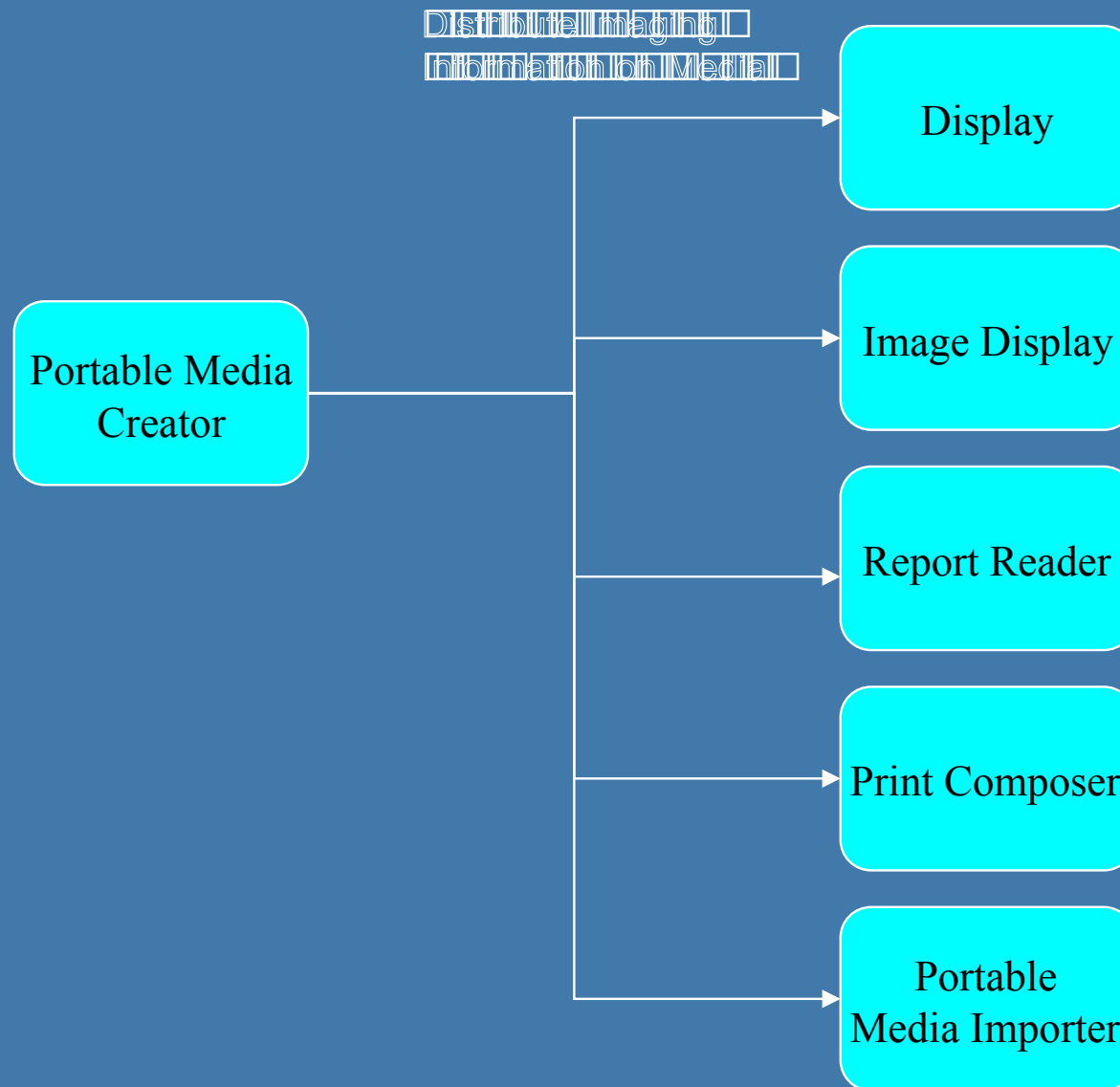
PDI – Validation

- **Interoperability validation is vital for media**
  - ➢ On the network, problems are
    - Immediate, unambiguous
    - Rapidly resolved
  - ➢ With portable media
    - Long delays in detection and recognition
    - Ambiguous or unknown source vendor/version
    - Long delays in resolution
    - Large volume of non-interoperable media created due to delays
    - Recipients lack technical expertise to debug problems
  - ➢ Standard set by film
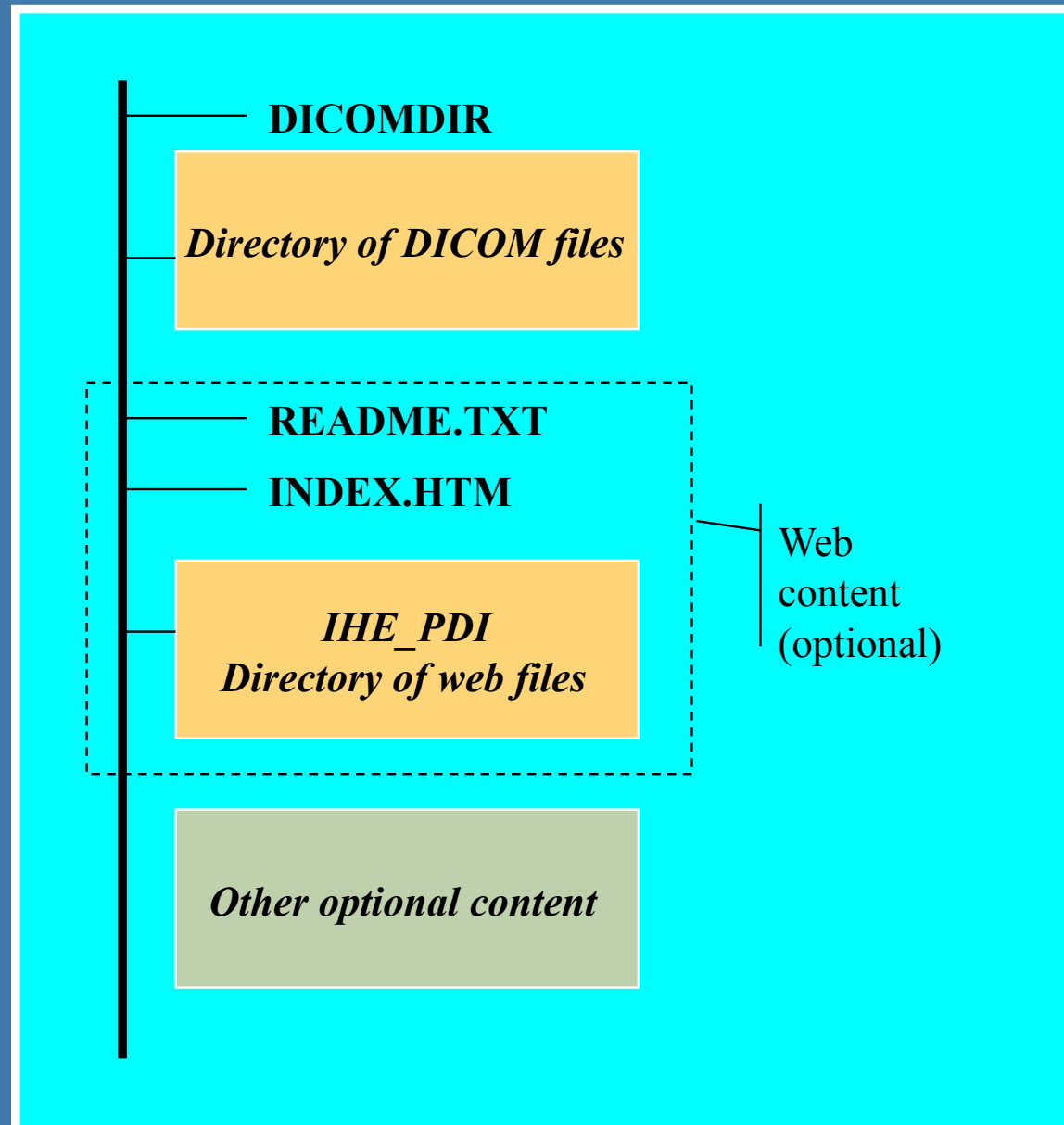   - No interoperability problems

PDI – Validation

- **Validation of *devices* at IHE Connectathon**
  - ➢ Portable Media Creators
  - ➢ Portable Media Importers
- **Validation with *IHE sample PDI media***
  - ➢ Anyone can test Portable Media Importers
- **IHE PDI media *validation software***
  - ➢ Anyone can test Portable Media itself
  - ➢ Debug problems with unreadable media
- **Currently is no IHE PDI "certification"**
  - ➢ Contrast with German DRG process

PDI – CD Structure

DICOMDIR

Directory of DICOM files

README.TXT

INDEX.HTM

Web content (optional)

IHE_PDI
Directory of web files

Other optional content

PDI – Web Content Option

- **Goal is to addresses users who can't, won't or do not need to import or view DICOM images**

- **Any Internet browser should be able to display web content (hence constrained file types)**

- **Web content, if present, is required to reflect "*the full set of the exported DICOM data or a subset considered at the time of creation to faithfully represent the patient's clinical condition*"**

- **E.g., may be just images selected by key image notes, if present**

PDI – Non-goals

- **Viewers**
  - ➤ Does not mandate (or prohibit) the presence of a viewer included on the media
  - ➤ Does not specify requirements for viewer features
  - ➤ Does not mandate that any viewer support all objects on the media

- **Reports**
  - ➤ Recommends but does not mandate the presence of a report
  - ➤ Does not restrict the format of any report that is present (can be DICOM, or other)

PDI - Adoption

- **Only a few remaining PACS vendors fail to create PDI media and use proprietary formats**

- **3rd party creators have embraced PDI**

- **Most DICOM creators upgraded to PDI**

- **Still, few CDs in the field are perfectly compliant, but most are "readable"**

PDI - Problems

- **Uncompressed CDs too small, too slow**
  - ➢ Very large cross-sectional datasets (CT/PET)
  - ➢ Very large images (mammograms)
  - ➢ Multiple prior studies
- **Spanning multiple CDs - hard to view**
- **Media has no privacy protection**
- **Viewers are not standardized**
- **Divergence from national requirements**
  - ➢ DRG in Germany, Australia, UK

PDI - Extensions

- **Year 11 (2008-2009) work in progress**
- **New media types**
  - ➤ DVD – higher capacity, now widely interoperable
  - ➤ USB memory – high capacity, high speed, incremental
- **Compression**
  - ➤ Lossless and lossy
  - ➤ JPEG and JPEG 2000
  - ➤ Supported by existing DICOM profiles
  - ➤ Linked to DVD and USB options

PDI - Extensions

- **Year 11 (2008-2009) work in progress**
- **Privacy protection option**
  - Password-based encryption
  - Per file using DICOM secure media profile
  - Does not require installation or administrator privileges for recipient
- **Sending software option**
  - On-board software to DICOM network send
  - Including decrypt, decompress, unsupported SOP Class fall back conversion, import reconciliation

Basic Image Review Profile

- **Year 11 (2008-2009) work in progress**
- **Requirements for an on-board viewer**
  - ➢ Support for all objects on the media
  - ➢ Side-by-side series comparison
  - ➢ Synchronized scroll/zoom/pan
  - ➢ Cross-referencing of location
  - ➢ Thumbnail based navigation
- **Obvious to use: standard icons, tool tips**
- **No "non-diagnostic" disclaimer !**

PDI – Conclusions

- **PDI good**

- **Proprietary media bad**

- **Poor quality DICOM/PDI also bad**

- **PDI is the new "_standard of care_" – sites may not be paid and may be liable if not**

- **_Sites_ responsible to be sure media is PDI compliant – use 3rd party software if primary PACS vendor is inadequate**