



# Electronic

Record

#### Preservation





## Preservation Challenges

#### Technological Dependency

• Records rely on specific hardware, software, etc. to be read

#### Technical Obsolescence

- Little incentive to support older technology over time
- Hardware, software, platforms become obsolete by design

#### Storage Media

- All media deteriorates over time
- Theft and loss



# Fragility of digital information

#### Disk rot – gradual decay of CDs and DVDs







#### Hard disk drives (internal or external) 3-5 years



# Flash media 10 years

Cole



#### ...and



#### Unintelligibility of data

## Encrypted, expired, or password-protected



# ...But, it's not just a technology issue

- Policies
- Staff
- Training
- Governance
- Sustainable funding

# State Records Management Laws

(e) If the commission cannot accept custody of an archival state record, the record shall remain in the custody of the state agency and shall be preserved in accordance with this subchapter, rules adopted under this subchapter, and other terms on which the director and librarian and the agency head may agree.



State Agency legal responsibility Gov't Code Sec. 441.186(e)



# Best storage option?

A network server that gets backed up regularly







# Storage Media

#### LOCKSS and the "3 copy rule"

► Data redundancy – 2-3 backup copies

 Combinations of cloud backup, external USB hard drive, flash drive





## File Formats Matter

 The file format you choose will affect your longterm records management abilities

Most require conversion

Choose Preservation File Formats

 The most effective digital preservation techniques are pre-emptive



# File Formats: Text

Recommended:

- PDF "Archival" (PDF/A) (.pdf)
- OpenDocument text (.odt)
- Extensible Markup Language (.xml)
- Rich Text Format (.rtf)
- Text file (.txt)





## File Formats: Spreadsheets

#### Recommended:

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1	Item #	Description	Vendor Cate	gory	Size	Unit	Starting Qty	Starting Value	Wk 1 Qty	Wk 1 Cost	Wk 2 Qty	Wk 2 Cost	Wk 3 Qty Wk 3	Cost W	/k 4 Qty
2	492229	TURKEY SLICED .5 OZ	Ben E Keith 2 - FF	ROZEN FOOD	0	0	0.00	\$ -	0.00	\$ -	0.00	\$ -	0.00 \$	-	0.00
3	662371	DRESSING CAESAR CREAMY	Ben E Keith 4 - G	ROCERY	0	0	0.00	\$ -	0.00	\$ -	0.00	\$ -	0.00 \$	-	0.00
4	779243	MARGARINE LIQUID OLEO	Ben E Keith 4 - G	ROCERY	0	0	0.00	\$ -	0.00	\$ -	0.00	\$ -	0.00 \$	-	0.00
5	815306	LID PLAS SOUFFLE CLEAR	Ben E Keith 4 - G	ROCERY	0	0	0.00	\$ -	0.00	\$ -	0.00	\$ -	0.00 \$	-	0.00
6	860055	LID PLAS 16SL SLOTTED	Ben E Keith 4 - G	ROCERY	0	0	0.00	\$ -	0.00	\$ -	0.00	\$ -	0.00 \$	-	0.00
7	860060	CUP FOAM 16OZ 16J16	Ben E Keith 4 - G	ROCERY	0	0	0.00	\$ -	0.00	\$ -	0.00	\$ -	0.00 \$	-	0.00
8	774704	PAPRIKA	Ben E Keith 4 - G	ROCERY	0	0	0.00	\$ -	0.00	\$ -	1.00	\$ 5.79	0.00 \$	-	0.00
9	664005	Mustard Prepared	Ben E Keith 4 - G	ROCERY	512	floz	0.00	\$ -	1.00	\$ 3.75	0.00	\$ -	0.00 \$	-	0.00
10	750100	CHEESE PARMESAN SHRED	Ben E Keith 4 - G	ROCERY	0	0	0.00	\$ -	0.00	\$ -	0.00	\$ -	1.00 \$ 1	3.27	0.00
11	250025	EGG FRESH SHELL MED USDA AA	Ben E Keith 1 - Pl	RODUCE	0	0	0.00	\$ -	1.00	\$ 15.89	0.00	\$ -	0.00 \$	-	0.00
12	686034	VINEGAR APPL CIDER 40GRAIN	Ben E Keith 4 - G	ROCERY	0	0	0.00	\$ -	0.00	\$ -	1.00	\$ 17.77	0.00 \$	-	0.00
13	29078	LIME 12 CT	Ben E Keith 1 - Pl	RODUCE	12	ct	0.00	\$ -	2.00	\$ 8.99	0.00	\$ -	0.00 \$	-	0.00
14	650547	TOMATO DICED W/GREEN CHILES	Ben E Keith 4 - G	ROCERY	0	0	0.00	\$ -	1.00	\$ 18.88	0.00	\$ -	0.00 \$	2	0.00
15	286500	Ice Cream Vanilla Cr 3 Gal	Ben E Keith 6 - D	AIRY	384	floz	0.00	\$ -	0.00	\$ -	0.00	\$ -	0.00 \$	-	0.00
16	650474	KETCHUP FANCY 33% SOLIDS	Ben E Keith 4 - G	ROCERY	0	0	0.00	\$ -	1.00	\$ 20.69	0.00	\$ -	0.00 \$	-	0.00
17	140005	MUSHROOM WHITE SMALL BUTTON	Ben E Keith 1 - Pl	RODUCE	0	0	0.00	\$ -	1.00	\$ 20.98	0.00	\$ -	0.00 \$	4	0.00
18	771131	CROUTON SEASONED HOMESTYLE	Ben E Keith 4 - G	ROCERY	0	0	0.00	\$ -	0.00	\$ -	1.00	\$ 22.30	0.00 \$	-	0.00
19	660409	SAUCE LOUISIANA RED HOT	Ben E Keith 4 - G	ROCERY	0	0	0.00	ş -	1.00	\$ 11.24	0.00	\$ -	1.00 \$ 1	1.24	0.00
20	150015	Onion Green Iceless W/Root	Ben E Keith 1 - Pl	RODUCE	32	oz	0.00	\$ -	1.00	\$ 8.29	1.00	\$ 8.29	0.00 \$	-	0.00
21	780009	SUGAR BROWN LIGHT IN BAGS	Ben E Keith 4 - G	ROCERY	0	0	0.00	\$ -	0.00	\$ -	1.00	\$ 27.69	0.00 \$	-	0.00
22	155030	Onion Yellow Jumbo	Ben E Keith 1 - Pl	RODUCE	800	oz	0.00	\$ -	0.00	\$ -	1.00	\$ 13.99	0.00 \$	2	0.00
23	774173	Pepper Red Crushed	Ben E Keith 4 - G	ROCERY	52	oz	0.00	\$ -	0.00	\$ -	0.00	\$ -	0.00 \$	-	0.00
24	920919	TUMBLER 20 OZ AMBER	Ben E Keith 8 - E	QUIP & SUPPLY	0	0	0.00	\$ -	0.00	\$ -	1.00	\$ 29.99	0.00 \$	-	0.00 👻
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OpenDocument spreadsheet (.ods)

Comma-separated Values (.csv or .txt)

## File Formats: Images

Recommended:

♦ JPEG 2000 (.jp2)

Portable Network Graphics (.png)





## File Formats: Sound Recordings



- Recommended:
  - Wave/Broadcast Wave (BWF) (.wav)
  - Free Lossless Audio Codec (.flac)

## File Formats: Video Recordings

#### Recommended:

Matroska Media Container (.mkv)



## File Formats: Email

#### Recommended:

#### ◆ MBOX (.mbox)

• ...unless it doesn't need to be stored in the email account: TXT, PDF, print...





#### Preservation Goals

Availability

#### Authenticity

#### **Functionality**



## Availability

- The record is kept for its full retention period
- The record can be located









LinetYpe

PostScript - Mac

Myriad™ Headline

Titling

HALL R

# Usability

Includes Windows Anytime Upgrade

ROM

Microsoft° 32-Bit (x86) Edition © 2011 Microsoft Corporation

Part No. XI-65G-4091

Windows 7<sup>™</sup> Home Premium The record can be accessed

The record can be read

The record is complete



## Electronic Records

Standards and Procedures

(b) An electronic state record that is an archival record must be maintained by the agency through hardware and software migration and upgrades as authentic evidence of the state's business in accessible and searchable form, except as otherwise determined by the state archivist.



## Functionality



#### Methods

1. Computer Museum 2. Emulation 3. Recopying 4. Media Migration 5. Normalization 6. Microfilm

7.Print to Paper





Hardware Software Operating systems Disk drives

# Computer Museum

#### Preserve the computing environment in which the records were created



#### Benefits

#### Challenges

 Source document
untouched: lower risk of data loss

 No up-front costs
if simply retaining old hardware/software

 For obsolete, proprietary,
homegrown software: might be best (only) option

#### Technical

expertise needed

 Potentially costly to
service old equipment / pay programmer

## Emulation

# Keep data in its original format



Microsoft Windows 3.1 running in DOSBox, on Windows XP Image: Wikipedia Run obsolete programs on existing platforms through special emulation programs

#### Benefits

#### Challenges

Source document untouched: lower risk of data loss

- Scarcity (or nonexistence) of emulator
- Technical expertise required
- Software does not run as efficiently in emulator as in native environment



# Recopying



Copy the data to new media periodically Same medium, from (e.g.) an old CD to a new CD Also called "Refreshing"

#### Benefits

#### Challenges

 Source document untouched: lower risk of data loss

Relatively low-cost

Relatively easy

 Still not as safe as regularlybacked-up network storage

Small risk of data loss in recopying process

 Doesn't protect against storage media obsolescence issues

 Doesn't protect against file format obsolescence

# Media Migration

Move data off of obsolete storage media











 Source document untouched: lower risk of data loss

Relatively low-cost

Relatively easy

#### Challenges

 Still not as safe as regularlybacked-up network storage

Small risk of data loss in migration process

 Doesn't protect against storage media obsolescence issues

Doesn't protect against file format obsolescence

## Normalization







#### OpenDocument Text File (.odt)

Plain Text File (.txt)

PDF/A: PDF Archival (.pdf)

Convert data into Preservation (File) Formats

# Microfilming

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#### Create a microfilm copy

https://www.tsl.texas.gov/slrm/pubs/bulletin2

# Microfilming

Standards and Procedures



#### Benefits

• Life expectancy of 500 years in proper storage conditions

 Creates unalterable, authoritative copy

 Protects against technology change

 Can be scanned back into digital format

#### Space-saver

#### Challenges

 Slow retrieval time: not-toofrequently-used documents

 Can degrade if not stored properly

# Printing to paper

Alkaline paper recommended

#### Benefits

- Life expectancy of 1,000+ years in proper storage conditions
- Protects against technology change

 Printing rarely requires technological expertise

 Can be scanned back into digital format

#### Challenges

Takes up physical space

Not as searchable as electronic documents

Potential loss of metadata

Potential loss of functionality

![](_page_35_Picture_0.jpeg)

#### WRAP-UP

# Electronic records are fragile File formats are important Bulletins 1, 2, 4 Preservation Goals

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Please contact AR-EHS (ar-ehs@wtamu.edu), or 806-651-2270 for more information.