Digitizing Books:
Practices and Guidelines

Federal Depository Libraries and GPO Conference
December 12, 2013

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Library of Congress
The U.S. Federal Agencies Digitization Guidelines Initiative (FADGI)
**Washington, DC**

What is a digitized book?

- What is a digitized book?
  - Different from a newly made digital eBook.
- What are its parts?
  - Scanned raster images of pages are central.
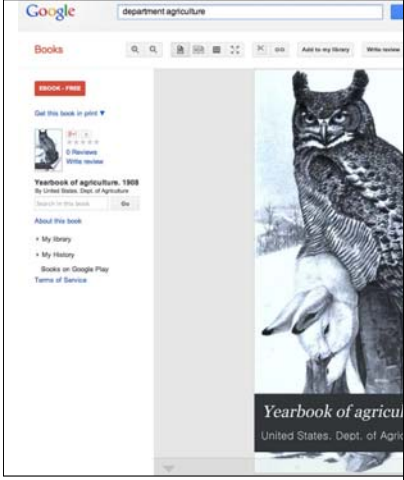- What guidelines or standards come into play?

2

What is a digitized book?

- This talk is about *preservation*, and concerns master files for long-term management
- Nevertheless, online access (also over the long-term) is the primary driver.
- *Let's work back from some examples today. What does a reformatted, online book consist of?*
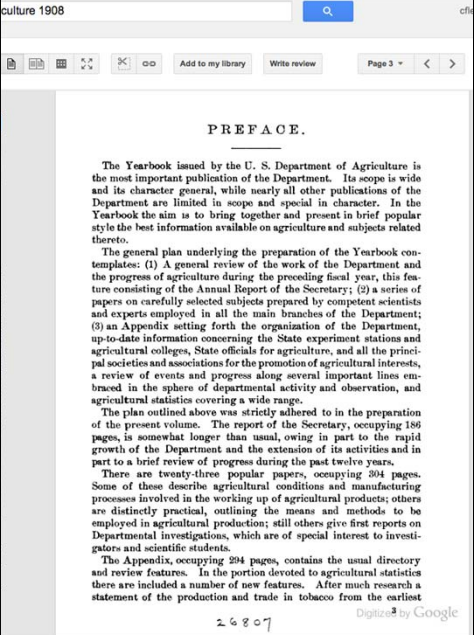
3

Google Example
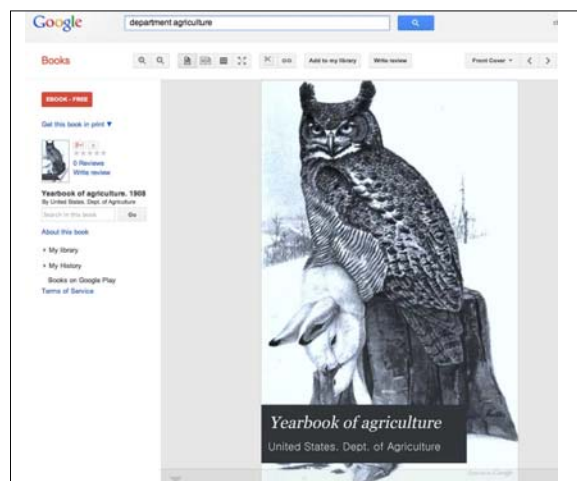
4

culture 1908 🔍 cfk

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PREFACE.

The Yearbook issued by the U. S. Department of Agriculture is the most important publication of the Department. Its scope is wide and its character general, while nearly all other publications of the Department are limited in scope and special in character. In the Yearbook the aim is to bring together and present in brief popular style the best information available on agriculture and subjects related thereto.

The general plan underlying the preparation of the Yearbook contemplates: (1) A general review of the work of the Department and the progress of agriculture during the preceding fiscal year, this feature consisting of the Annual Report of the Secretary; (2) a series of papers on carefully selected subjects prepared by competent scientists and experts employed in all the main branches of the Department; (3) an Appendix setting forth the organization of the Department, up-to-date information concerning the State experiment stations and agricultural colleges, State officials for agriculture, and all the principal societies and associations for the promotion of agricultural interests, a review of events and progress along several important lines embraced in the sphere of departmental activity and observation, and agricultural statistics covering a wide range.

The plan outlined above was strictly adhered to in the preparation of the present volume. The report of the Secretary, occupying 186 pages, is somewhat longer than usual, owing in part to the rapid growth of the Department and the extension of its activities and in part to a brief review of progress during the past twelve years.

There are twenty-three popular papers, occupying 304 pages. Some of these describe agricultural conditions and manufacturing processes involved in the working up of agricultural products; others are distinctly practical, outlining the means and methods to be employed in agricultural production; still others give first reports on Departmental investigations, which are of special interest to investigators and scientific students.

The Appendix, occupying 294 pages, contains the usual directory and review features. In the portion devoted to agricultural statistics there are included a number of new features. After much research a statement of the production and trade in tobacco from the earliest

26807

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Showing 17 results in this book for **beets** - Order by: relevance | pages

Page 443 »

Pathologist in Charge of Sugar-Beet Investigations, Bureau of Plant Industry.

INTRODUCTION.

The primary object in growing sugar beets is the production of refined sugar. Any other materials, therefore, that remain or are produced in the manufacture of refined sugar from beets should be classed as by-products. These consist chiefly of beet tops (leaves and

Page 700 »

1904	48	197,484	10.47	2,301,529	484,226,497	11.59	15.3	88.1	87
1903	49	242,576	8.56	2,076,404	481,200,087	11.59	*15.1	(?)	78
1902	41	216,400	8.76	1,893,812	436,811,685	11.02	*14.6	*88.3	94
1901	36	175,483	9.83	1,683,069	369,201,733	10.95	14.8	82.2	89

a By purity coefficient is meant the percentage of sugar in the total solids of the substance tested, whether it be beets, juice, or sugar. In this table it represents the average percentage of sugar in the total solids of the beets as determined by tests made at the factories.
b Tons of 2,000 pounds each.
c Grouped together to avoid giving publicity to data relating to individual factories.
d The average yield of beets per acre is found by dividing the total beets worked by the total acreage harvested; the average extraction of sugar by dividing the total sugar produced by the total beets worked; the average contents of sugar, coefficients of purity, and length of campaign by adding the figures reported

Page 571 »

The imported pea moth (*Enarmonia [Semasia] nigricana* Steph.) was injurious to peas at Charlevoix, Mich., this being the first record of injury in the United States.
The sugar-beet webworm (*Loxostege sticticalis* L.) was injurious in the vicinity of Longmont and Denver, Colo., and Hamilton City, Cal.
The southern beet webworm (*Pachyzancla bipunctalis* Fab.) was observed injuring beets and spinach in southern Texas.
The beet army worm (*Caradrina exigua* Hbn.) came under observation as a pest on sugar beet, alfalfa, and peas in California; it also did injury to eucalyptus. In Utah it was injurious to sugar beet.
The hop flea-beetle (*Psylliodes punctulata* Melsh.), a common beet pest, was more injurious than before reported. In British Columbia injury extended to near the

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$2,000,000. It is evident, therefore, that beet tops have not received the attention due them, either as a fertilizer or as a stock food.

PULP.

The material that remains after the beets have been sliced and the sugar has been extracted is known as pulp. Fresh pulp constitutes about 80 per cent of the weight of the beets. In the process of extraction the beets lose nearly all their sugar, usually only a fraction

Library of Congress Example

Slide 1

The Capital and the Bay: Narratives of Washington and the Chesapeake Bay Region, ca. 1600-1925
Ten years in Washington. Life and scenes in the National Capital, as a woman sees them.
(Turn to page) PREV PAGE | NEXT PAGE

Back to Bibliographic Information | The Capital and the Bay Home Page | Access bitonal (TIFF - 22K)

TEN YEARS IN WASHINGTON.

LIFE AND SCENES
IN
THE NATIONAL CAPITAL,
AS A WOMAN SEES THEM.

BY MARY CLEMMER AMES,

FULLY ILLUSTRATED WITH THIRTY FINE ENGRAVINGS,
AND
A PORTRAIT OF THE AUTHOR ON STEEL.

HARTFORD, CONN.:
A. D. WORTHINGTON & CO.

1873.

Back to Bibliographic Information | The Capital and the Bay Home Page | Access bitonal
(Turn to page) PREV PAGE | NEXT PAGE

AMERICAN MEMORY PREVIOUS NEXT NEW SEARCH

The Capital and the Bay: Narratives of Washington and the Chesapeake Bay Region, ca. 1600-1925

Ten years in Washington. Life and scenes in the National Capital, as a woman sees them

CHAPTER XII. WOMEN WITH CLAIMS.

Go to: Next Section ‖ Previous Section ‖ Table of Contents

(page image)

The Senate Reception Room--The People Who Haunt It--Republican "Ladies in Waiting"--"Women with Claims"--Their Heroic Persistency--A Widow and Claim Agents--The Committee of Claims--A Kind-hearted Senator's Troubles--Buttonholing a Senator--A Lady of Energy--Resolved to Win--An "Office Broker" a Woman--A Lady who is Feared if not Respected--Her Unfortunate Victims--Carrying "Her Measure"--The Beautiful Petitioner--The Cloudy Side of her Clever Dealings--Her Successes--How Government Prizes are Won.

THE room itself means only grace, beauty and silence. The moment had not come for dis-illusion, thus I went forth without a word regarding its human aspect.

To-day, dear friends, we will go in and face that. We sit down in the shadow of this Corinthian pillar, and, looking out see the most noticeable fact is that this long room is thronged with women. A number are conversing with senators; others are gazing toward the doors which lead into the Senate. Some seem to be waiting with eager faces; others are leaning back upon the sofas in attitudes of luxurious listlessness. Do you ask why they are here? Are they studying the stately proportions and the anteroom? Not at all. It is not devotion to the aesthetic arts nor the inspiration of patriotism, which brings these women thither. They are a few, only a very few,

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(page image)

women--with "claims," who, through the sessions of Congress haunt the departments, the White House and the Capitol.

The dejected looking woman on the sofa opposite is a widow, with numerous small children. You may be certain by the unhopeful expression of her face that it is a case which, almost unaided and alone, she is trying to "work through" Congress. Her home is far distant. She borrowed money to come here, she borrows money to stay, money to pay her own board; borrows money to pay the exorbitant fees of the claimagent, who, constantly fanning the flame of "great expectations," assures her that Congress will pay her the thousands which she demands for her losses--will pay her this very session...

Slide 2

AMERICAN MEMORY   LIBRARY of CONGRESS

About the SGML version

In addition to the full text that can be viewed directly through your web browser, this document is also available encoded in Standard Generalized Markup Language (SGML) according to the American Memory DTD.

No current SGML viewer is available for download, but an older, free SGML viewer is available, or the .sgm file can be downloaded and viewed with any ASCII text editor.

If you already have an SGML viewer, continue on to the SGML version of the document (1 megabyte).

Back to previous page

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Washington, DC, 2000.
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University-plus Example: Hathi Trust

Aviation Safety

stallation of smoke detectors in airplane lavatories.
— Require the installation of automatic fire extinguishers capable of sensing and extinguishing fires in, and adjacent to, waste receptacles in airline lavatories.
— Evaluate the electrical circuit protection—including reduced circuit breaker-rated values—needed to eliminate the potential for overheating in the lavatory flushing pump motor systems in transport category airplanes.
— Prescribe a minimum number of portable protective full face mask apparatus to be carried in the passenger compartment of airliners.

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Back to Search Results
Previous record Showing record 121 of 5126 Next record   Cite this   Export to Endnote

Annual report to Congress / National Transportation Safety Board.

New Title:	Annual report
Corporate Author:	United States.
Language(s):	English
Published:	[Washington, D.C.] : National Transportation Safety Board : [1967-1984]
Subjects:	United States. > National Transportation Safety Board > Periodicals. Transportation > Safety > Periodicals. Transportation > United States > Safety measures > Periodicals.
Note:	Vols. for [1984] distributed to depository libraries in microfiche.
Physical Description:	17 v. : ill. ; 24-28 cm.
Locate a Print Version:	Find in a library

Viewability:

Full view	1983	(original from Northwestern University)
Full view	1970	(original from University of Michigan)
Full view	1968	(original from University of Michigan)
Full view	1978-83	(original from University of Michigan)
Full view	v.2-11 1968-1977	(original from University of Michigan)
Full view	1967	(original from Northwestern University)
Full view	1979	(original from Northwestern University)
Full view	1980	(original from Northwestern University)
Full view	1982	(original from Northwestern University)

About this Book

Annual report to Congress / National Transportation ... 1983.

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Partner login required

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15

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Ingredients

- Underlying materials: the basic inputs
  - Catalog record or equivalent
  - Set of images
  - Marked-up text
- Secondary elements
  - Additional output versions
    - PDFs, other eBooks, handoff to hard-copy producers, PKI
- Elements from "presentation" IT systems
  - Interface, presentation structure
  - Index and search functions
  - Additional output versions may be produced on the fly

Typical Production

- Initial stage
  - **Cataloging**

  - **Scanning to produce images**

- Second stage
  - **OCR the images to produce text**

- Third stage
  - **Process the text to added markup, other prep**

  - **Create some additional output versions (PDF, eBook, hard copy)**

- Fourth stage
  - **Load elements, index data, etc.**

  - **Create some additional output versions**

Typical Production Standards or Guidelines

- Initial stage
  - **Cataloging**
    - **library standards: MARC, MODS, etc.**
  - **Scanning to produce images**
    - **FADGI guidelines**
- Second stage
  - **OCR the images to produce text**
    - **various software apps, effectiveness has increased over time**
- Third stage
  - **Process the text to added markup, other prep**
    - **practices vary (TEI Lite, AM DTD, METS, other)**
  - **Create some additional output versions (PDF, eBook, hard copy)**
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http://www.digitizationguidelines.gov/

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18 Participating Agencies

http://www.digitizationguidelines.gov/participants/

Often participating, not "official": NASA, NOAA, National Museum of Health and Medicine (U.S. Army), U.S. Supreme Court

2

Scanned Image Specifications

- Something of a line-drawing exercise
- Purpose, goal
  - If the term *preservation* is used, the stakes are higher
- Category of original item
  - If materials are rare, or only held in a few libraries, the stakes are higher
  - If materials contain important illustration or diagrams (and in color), the stakes are higher

How do you indicate higher stakes?

- FADGI guidelines use *stars*
- Every specification factor has an *aim point*
  - *For example, spatial resolution might have 400 ppi as the aim point*
- Every aim point has a way to measure
  - *Every measurement allows for plus-minus tolerances*
- Star rating
  - 4 star – very close to aim point
  - 3 star – pretty close
  - 2 star – not bad
  - 1 star – just OK

Rough Rule of Thumb

- 4-star
  - Artwork, world and national treasures, etc.
- 3-star
  - Unique manuscript and archival documents
- 2-star
  - General collections (not unique) and printed publications
- 1-star
  - Text conversion, image quality not important

Recent LC Example 1

- High end, set of important books, foreign imprints
- Non-destructive scanning ("don't hurt the books")
- 400 ppi and 24-bit RGB color
- 120 or 180 degree *V* opening in a book cradle
- Overhead scanner shall meet a 3-star or better imaging performance rating as defined in the FADGI 2010 guidelines
- Scanner calibration and image processing
  - **to be set for originals with a density range of 0.04 to 2.04 and the following aimpoints - a medium density range appropriate for a variety of originals (printed text and graphics, some photos) and optimized for general monitor viewing on monitors calibrated to sRGB or AdobeRGB 1998 environments:**
    - **Density of 0.04 (patch 10 on the DICE targets, patch A on Q13/Q14) should be RGB level 242-242-242**
    - **Density of 0.75 (patch 16 on the DICE targets, patch M on Q13/Q14) should be RGB level 104-104-104**
    - **Density of 2.04 (patch 20 on the DICE targets, patch 19 on Q13/Q14) should be RGB level 11-11-11**

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Non-Destructive Scanning
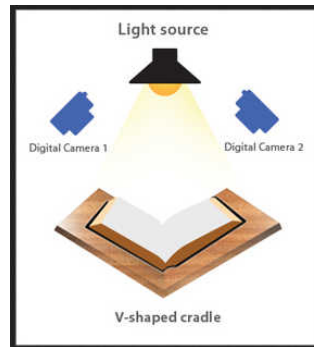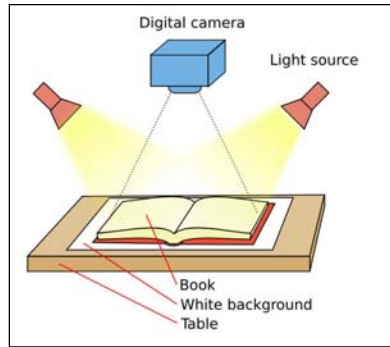
Drawings from Wikipedia
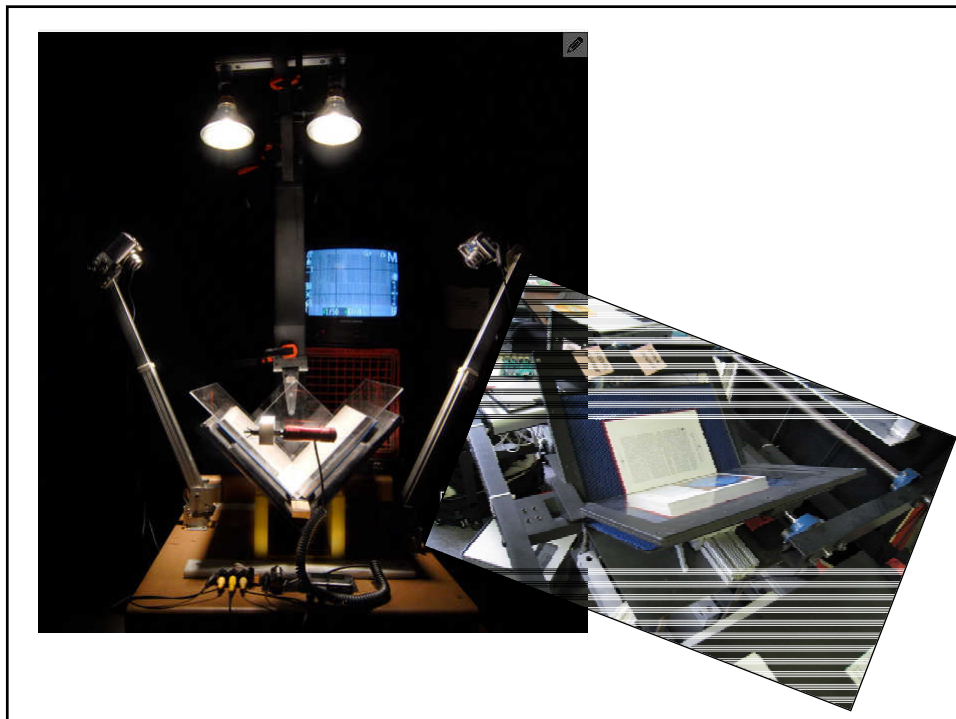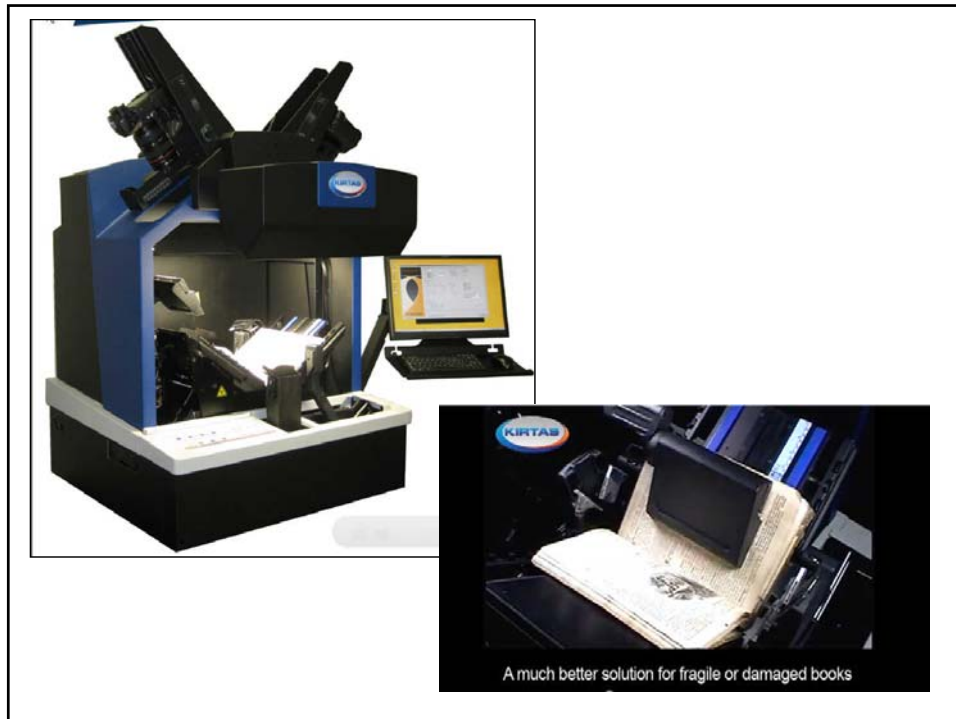
A much better solution for fragile or damaged books

Recent LC Example 2

- Congressional documents, widely held, recent and not rare, no illustrations
- Documents will be disbound, can be sheet-fed
  - aka Automatic Document Feeder (ADF)
  - In some contexts, especially if the books are guillotined to free up the pages (ours are not), this would be called *destructive* scanning.
- SOW calls for 400 ppi and 8-bit grayscale
- Far fewer other specifications
- In a task order where 2-star is understood
  - *BTW: still uncompressed image data in TIFF wrapper, but studying JPEG 2000, even lossy for some content*

Recent LC Example 2

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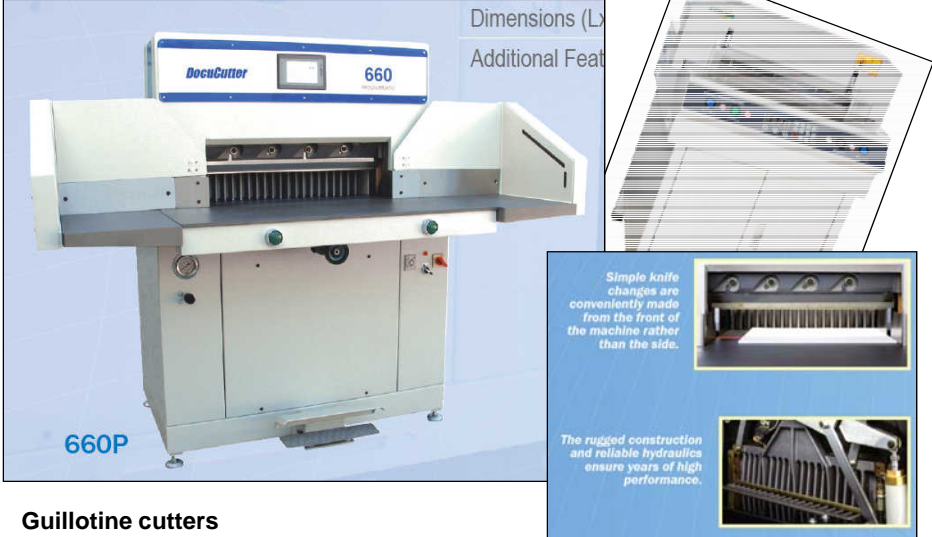
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File Format

- TIFF file wrapper
- RGB 24-bit color or grayscale
- LC produces uncompressed images
- Other organizations use lossless LZW compression
- However, file size is leading us to consider JPEG 2000
- JPEG 2000 can be used in lossless or lossy modes

Destructive Scanning

Guillotine cutters

ADF (Automatic Document Feeder) or sheet-feed scanners

FADGI Imaging Guideline

Still image specifications – this is what we all "used to do"

- **color/monochromatic**
- **pixels per inch (ppi; aka old "dpi")**
- **bit depth**
- **. . . usually output-referred**

We want to move toward more scientific metrics

<u>Tone</u>	<u>Resolution</u>	<u>Color</u>	<u>Uniformity</u>	<u>Noise</u>
● Gamma ● White Balance	● Spatial Frequency Response (SFR) ● Resolution ● Sampling Efficiency ● Sampling Frequency	● Luminance ● Delta E$_{2000}$ ● Delta E(a*b*)$_{2000}$ ● Channel Mis-registration	● % Lighting Non-uniformity	● Total rms deviation

From this document:
http://www.digitizationguidelines.gov/guidelines/DIFfinal.pdf

Rethinking Resolution

- We have all had the tendency to talk about the pixels per inch (ppi) delivered by a scanner as the *resolution . . . .*

- Regarding the scanner setting, it would be better to call it *SAMPLING FREQUENCY* or *SAMPLING RATE.*

Rethinking Resolution

- Meanwhile, there is an ISO standard for *RESOLUTION* (ISO 12233). This gets at the actual "optical" result delivered by the device.

- Among other elements, the ISO standard asks you to measure resolution via *SPATIAL FREQUENCY RESPONSE (SFR).* You image a target, do some math, and present the numbers on a graph.

Rethinking Resolution

- Knowing the Spatial Frequency Response (SFR) lets you compare the scanner's setting (sampling frequency) with what you get (in true optical terms).
- FADGI documents call what you get *EFFECTIVE RESOLUTION*.
- The comparison of scanner setting and effective resolution is what we call *SAMPLING EFFICIENCY*.

Sampling Efficiency and Corresponding Effective Resolution

Desired Spatial Resolution	Scanner Sampling Efficiency and Corresponding Effective Resolution											
	100%	96%	95%	91%	90%	85%	81%	80%	75%	70%	65%	60%
5000 ppi	5000	4800	4750	4550	4500	4250	4050	4000	3750	3500	3250	3000
2500 ppi	2500	2400	2375	2275	2250	2125	2025	2000	1875	1750	1625	1500
1200 ppi	1200	1152	1140	1092	1080	1020	972	960	900	840	780	720
800 ppi	800	768	760	728	720	680	648	640	600	560	520	480
600 ppi	600	576	570	546	540	510	486	480	450	420	390	360
400 ppi	400	384	380	364	360	340	324	320	300	280	260	240
300 ppi	300	288	285	273	270	255	243	240	225	210	195	180
200 ppi	200	192	190	182	180	170	162	160	150	140	130	120
100 ppi	100	96	95	91	90	85	81	85	75	70	65	60
Spurious Resolution and Storage Overhead*		108%	111%	121%	123%	138%	152%	156%	178%	204%	237%	278%
Imaging Performance Level**	4-star (> 95% and up to 100%)		3-star (> 90% and up to 95%)		2-star (> 80% and up to 90%)		1-star (80% or less)					

Sampling Efficiency and Corresponding Effective Resolution

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2500 ppi	2500	2400	2375	2275	2250	2125	2025	2000	1875	1750	1625	1500
1200 ppi	1200	1152	1140	1092	1080	1020	972	960	900	840	780	720
800 ppi	800	768	760	728	720	680	648	640	600	560	520	480
600 ppi	600	576	570	546	540	510	486	480	450	420	390	360
400 ppi	400	384	380	364	360	340	324	320	300	280	260	240
300 ppi	300	288	285	273	270	255	243	240	225	210	195	180
200 ppi	200	192	190	182	180	170	162	160	150	140	130	120
100 ppi	100	96	95	91	90	85	81	85	75	70	65	60
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Sampling Efficiency and Corresponding Effective Resolution

Desired Spatial Resolution	Scanner Sampling Efficiency and Corresponding Effective Resolution											
	100%	96%	95%	91%	90%	85%	81%	80%	75%	70%	65%	60%
5000 ppi	5000	4800	4750	4550	4500	4250	4050	4000	3750	3500	3250	3000
2500 ppi	2500	2400	2375	2275	2250	2125	2025	2000	1875	1750	1625	1500
1200 ppi	1200	1152	1140	1092	1080	1020	972	960	900	840	780	720
800 ppi	800	768	760	728	720	680	648	640	600	560	520	480
600 ppi	600	576	570	546	540	510	486	480	450	420	390	360
400 ppi	400	384	380	364	360	340	324	320	300	280	260	240
300 ppi	300	288	285	273	270	255	243	240	225	210	195	180
200 ppi	200	192	190	182	180	170	162	160	150	140	130	120
100 ppi	100	96	95	91	90	85	81	85	75	70	65	60
Spurious Resolution and Storage Overhead*		108%	111%	121%	123%	138%	152%	156%	178%	204%	237%	278%
Imaging Performance Level**	4-star (> 95% and up to 100%)		3-star (> 90% and up to 95%)		2-star (> 80% and up to 90%)		1-star (80% or less)					

4-star: Likely to require a slower and more costly process.

Sampling Efficiency and Corresponding Effective Resolution

Desired Spatial Resolution	Scanner Sampling Efficiency and Corresponding Effective Resolution											
	100%	96%	95%	91%	90%	85%	81%	80%	75%	70%	65%	60%
5000 ppi	5000	4800	4750	4550	4500	4250	4050	4000	3750	3500	3250	3000
2500 ppi	2500	2400	2375	2275	2250	2125	2025	2000	1875	1750	1625	1500
1200 ppi	1200	1152	1140	1092	1080	1020	972	960	900	840	780	720
800 ppi	800	768	760	728	720	680	648	640	600	560	520	480
600 ppi	600	576	570	546	540	510	486	480	450	420	390	360
400 ppi	400	384	380	364	360	340	324	320	300	280	260	240
300 ppi	300	288	285	273	270	255	243	240	225	210	195	180
200 ppi	200	192	190	182	180	170	162	160	150	140	130	120
100 ppi	100	96	95	91	90	85	81	85	75	70	65	60
Spurious Resolution and Storage Overhead*		108%	111%	121%	123%	138%	152%	156%	178%	204%	237%	278%
Imaging Performance Level**	4-star (> 95% and up to 100%)		3-star (> 90% and up to 95%)		2-star (> 80% and up to 90%)			1-star (80% or less)				

2-star: Likely to permit a faster and less costly process.

Rethinking Resolution

Thanks to Barry Wheeler for his very helpful Signal blogs:

http://blogs.loc.gov/digitalpreservation/2012/12/what-resolution-should-i-use-part-1/

http://blogs.loc.gov/digitalpreservation/2013/01/what-resolution-should-i-use-part-2/

http://blogs.loc.gov/digitalpreservation/2013/03/what-resolution-should-i-use-part-3/

From the revised guideline

Tools to Support
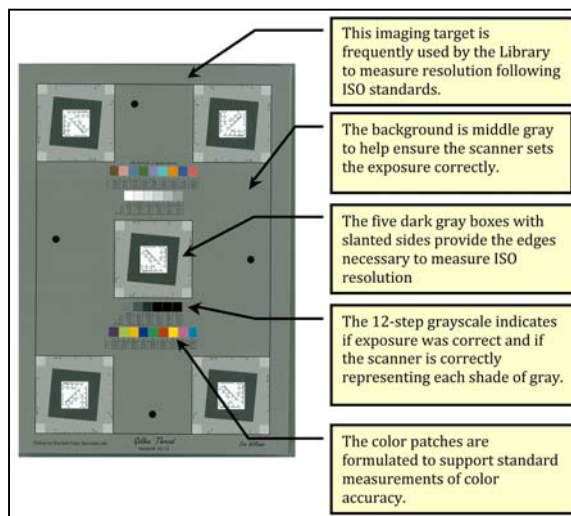# Image Performance Measurement

- Digital Image Conformance Evaluation (DICE) System
  - **Device Target** – Imaging Device Performance
  - **Object Target** – Actual Image Quality
  - **Software** for Evaluation/Validation
- Software still under development
  - Built on a commercial library of math tools
  - Future: FADGI plan to build as open source
- Commercial equivalent sold by Image Science Associates, Inc.
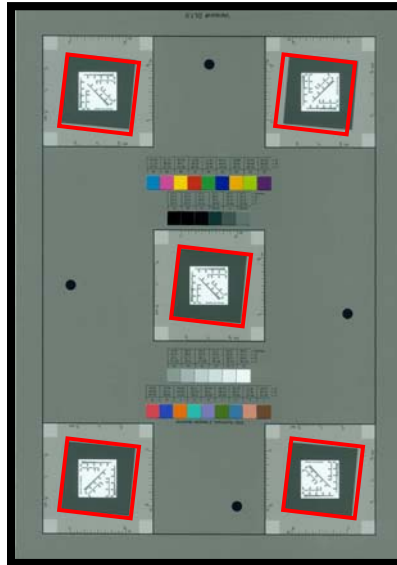
Device and Object Targets
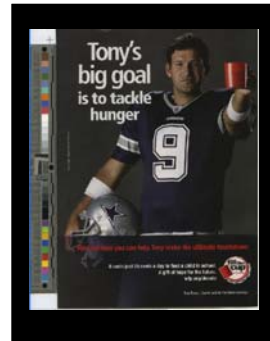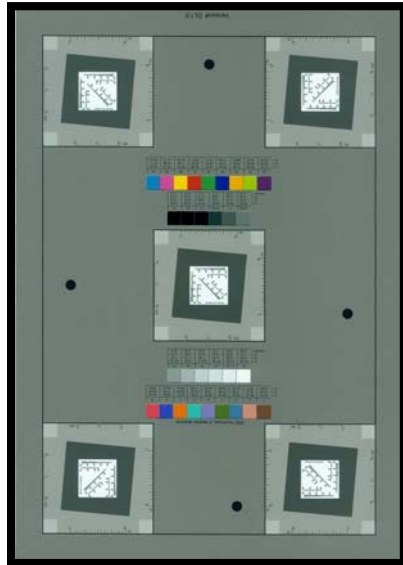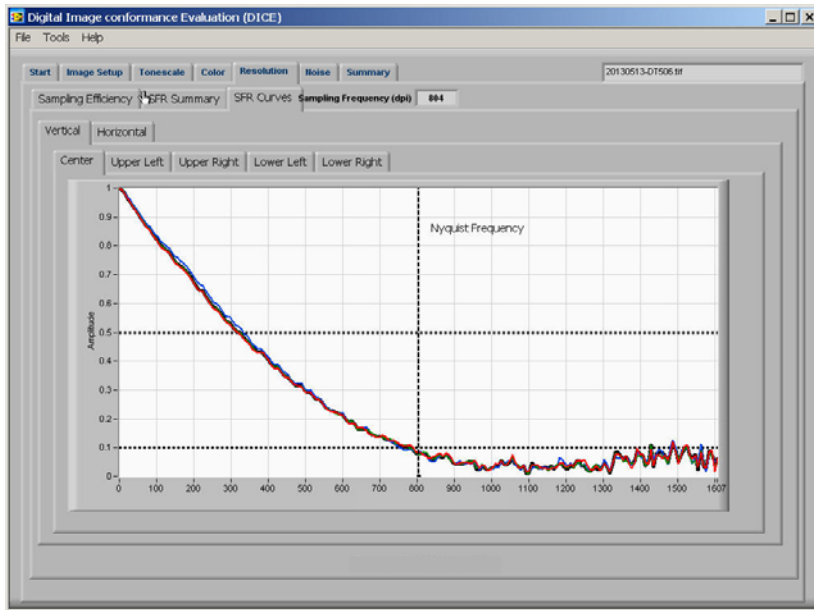

Object target as positioned for use

Device Target

This imaging target is frequently used by the Library to measure resolution following ISO standards.

The background is middle gray to help ensure the scanner sets the exposure correctly.

The five dark gray boxes with slanted sides provide the edges necessary to measure ISO resolution

The 12-step grayscale indicates if exposure was correct and if the scanner is correctly representing each shade of gray.

The color patches are formulated to support standard measurements of color accuracy.

Device Target

DICE – SFR detail page

**Federal Agencies
Digitization Guidelines Initiative**

http://www.digitizationguidelines.gov/

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