Geog183: Cartographic Design and Geovisualization Spring Quarter 2020

Lecture 10: Production, Reproduction and Dissemination
Historical development

- Ancient maps: many media and materials
- Papyrus used in Ancient Egypt 4th Century BC
- **Paper** was invented in ancient China during the Han Dynasty (about 100 BC) using mulberry bark and hemp rags
- Printing press developed in China by the Han Chinese printer Bi Sheng between the years 1041 and 1048
- German printer Johannes Gutenberg in 1450
- Printing revolution
- Wood, stone, copper engraving
- Offset press in 1875 by Robert Barclay of England for printing on tin, and in 1904 by Ira Washington Rubel of the United States for printing on paper.
Turin Papyrus map
Ancient Egyptian map
Oldest surviving map of topographical interest from the ancient world
Discovered at Deir el-Medina in Thebes
Drawn about 1160 BC by Amennakhte
Prepared for Ramesses IV's quarrying expedition to the Wadi Hammamat to obtain blocks of bekhen-stone
Copper plate engraving: Wax and oil + ink
Intaglio
Offset printing: Uses CMYK color model
Lithography (Offset printing) and Photography
InkJet and LED displays/projectors
Technology dependence

Relationship of Line Screen to Printer Resolution

- **Low Resolution Printer**
  - 8 x 8 grid yields 64 "spots" per halftone cell for a total of 64 different shades of gray

- **High Resolution Printer**
  - 16 x 16 grid yields 256 "spots" per halftone cell for a total of 256 different shades of gray

Banding (left) in a continuous tone image due to insufficient printer resolution for the chosen line screen
Dissemination

• Print for sales
• Print for other media, books, magazines, newspapers
• Often required continuous series and coverage
• Massive update problem
• Most maps sat unused (but lasted well)
• Atlas moved to digital then web
• Web mapping uses blogs, newsfeeds, social media, twitter, etc for dissemination
• Map providers now online powerhouses, Google, Here, Bing, Apple
Map editing
Revision with images and provisional line maps
Revision to OpenStreetMap
Let's put Beirut on the Map!

OpenStreetMap.org

Hamra/AUB sector
Saturday 29 August at 11:00 am

It's fun. It's free. You can help. Check tr.im/mapbeirut
Separations

A

- Digital map file
- Film negative
- Map
- Printing plate (positive)

B

- Digital map file
- Film negatives (color separations)
- Cyan, Magenta, Yellow, Black
- Printing plates (positives)
Mylar map separates--Scribing
Mass reproduction

Application Software
Produces digital map file (vector and/or raster data models)

Printer Driver
Converts digital map file into page description data (in a particular page description language)

Raster Image Processor (RIP)
Interprets page description data and produces raster image

Printing Device
Processes raster image and prints the map

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Dot screening
Density, screening
Pantone
Proofs

- Digital Proofs
  - On-screen display
  - Monochrome composite
  - Color composite
- Separation-Based Proofs
  - Overlay
  - Laminate
  - Press check

Cost and Quality: Lowest → Cost and Quality → Highest

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Enter the Internet
Leonard Kleinrock demonstrates how the first Internet communication was made with the help of an Interface Message Processor machine at his office at the UCLA Computer Science Department in Los Angeles 1969.
Apple’s Hypercard “Stacks”
Arrival of the Browsers

NCSA Mosaic for MS Windows

document title: NCSA Mosaic Home Page
Document URL: http://www.ncsa.uiuc.edu/SDG/Software/Mosaic/NCSC

Welcome to NCSA Mosaic, an Internet information bro
Mosaic was developed at the National Center for Sup
University of Illinois in --> Urbana-Champaign. NCS
The Board of Trustees of the University of Illinois UI.
Welcome to the GNU Project web server, www.gnu.org. The GNU Project was launched in 1983 to develop a complete, free software operating system. It is based on the GNU/Linux operating system, which uses the kernel Linux, and is now the most widely used free software operating system. Although GNU/Linux is often used as a euphemism for GNU, Linux, and GNU/Linux, the GNU software is more accurately called GNU/Linux.

This is also the web site of the Free Software Foundation (FSF). FSF is the principal organizational sponsor of the GNU project. FSF is a non-profit organization to support the development and promotion of free computer software. The FSF holds the rights to the GNU software, which is distributed under the GNU General Public License. The GNU General Public License allows users to freely use, copy, distribute, modify, and distribute computer software, and to defend the rights of others to do so.

This is a new version of the NextStep WorldWideWeb application with the NeXTSTEP library. Bug reports should be sent to mailto:info@cern.ch, quoting the version information above. Check the list of known bugs in the web site.

This was the original prototype for the WorldWideWeb program. Many features of the WorldWideWeb are now standard in other programs, as is the hypertext markup language HTML. After many months of development, this application has now sprouted images and is more powerful than the original. HTML allows you to embed images, styles, and other elements into your documents. If you have an Internet connection, then using "Help" under the Info menu will tell you all about this application. If you don't have an Internet connection, get one! :)

If you want to be able to read news, you should set the name of your local news server in the preferences.

For more information, visit http://www.gnu.org/
Arc Internet Map Server (ArcIMS)

- Advanced web GIS
- Product of ESRI
- Simplified ArcView
  - Basic GIS functions
- Single interface
- Uses ArcView Shapefiles
- June 2000
Software Mash-Ups

The Homicide Report
THE TIMES CHRONICLES L.A. COUNTY HOMICIDE VICTIMS

Showing 24 homicides from Jan. 1, 2012 to Jan. 15, 2012

Homicides are grouped based on number of homicides in an area. Click a group to zoom there.
Enter the GeoBrowser

- Google Local 2004-5
- Data “Portals”
- Data “Clearinghouses”
- NSDI -> GSDI
- Open APIs
- Discoverable data (Linked data)
<?xml version="1.0" encoding="UTF-8"?>
<kml xmlns="http://earth.google.com/kml/2.2">
<Placemark>
<name>Simple placemark</name>
<description>Attached to the ground. Intelligently places itself at the height of the underlying terrain.</description>
<Point>
<coordinates>
-122.0822035425683,37.42228990140251,0
</coordinates>
</Point>
</Placemark>
</kml>
Web mapping

• Components
  – Server
  – User
  – Mapper
  – API/Software tools
  – Publishing tools

• Bonus
  – Interaction
  – Animation
  – Real time update
  – Full color and transparency support
  – Open, free, mobile
“Given enough eyeballs, all bugs are shallow.”
Open Source GIS

• Basis in standards: OGC critical, but others e.g. GeoVRML, X11, GeoPDF, GeoJSON
• Includes code level tools, scripts, libraries, and utilities
• Clearinghouses for information: e.g. opensource.org
• Support fora, wikis, lists, etc
• Whole GIS systems e.g. GRASS, QGIS
• Whole web-based services e.g. MapServer, PostGIS
Sample code libraries

• cgal.org: CGAL Open Source Project to provide easy access to efficient and reliable geometric algorithms in the form of a C++ library

• OGR: Simple features library, C++ open source library (and command line tools) providing R/W access to vector file formats

• GEOS: Geometry Engine - Open Source, C++ port of the Java Topology Suite (JTS)
HTML: Extend with GML, SVG, PHP, JavaScript
Link to video, etc
For example: GeoJSON is used by

• OpenLayers
• Leaflet
• MapServer
• Geoforge software
• GeoServer
• GeoDjango
• GDAL
• Safe Software FME
• CartoDB
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GeoJSON simple objects
Sample software tools

- TARDEM, A suite of programs for the Analysis of Digital Elevation Data
- Merkaartor is an OpenStreetMap editor distributed under the GNU General Public License
- Worldwind: browser tool for geospatial data
For example: uDig
For example: Quantum GIS
Open data
Wikimapia
ArcGIS Online

The Mapping Platform for Your Organization

ArcGIS Online gives you everything you need to create interactive web maps and apps that you can share with anyone. With ready-to-use content, apps, and templates, you can be productive right away. And no matter what you use—desktops, browsers, smartphones, or tablets—you always have access to your content.
Maya Forest GIS on ArcGIS Online

The El Pilar Project has been conducting research at El Pilar, Belize and Guatemala since 1993, and was founded on a base of survey work that goes back to 1983. This unusual archaeological program recognizes the present environment as a part of the ancient Maya past. Our mission is the preservation and conservation of endangered resources through...
Example: ICM for UCSB
CartoDB: Cloud model
For example: Leaflet
Components

- Mapbox: Bundles map tiles at URL
- CartoDB, MangoMap, Tableau
- Leaflet: Cascading Style Sheets and Javascript Library plus Java
- Many add ons
- Need server access (WAMPserver/Wordpress/Github)
- Embed scripts into HTML
- Uses some PHP, interprets SVG, uses Cloudmade
<html>
<head>
    <title>Based on Quick Start Example on Leaflet Website</title>
    <meta charset="utf-8" />
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <link rel="stylesheet" href="http://cdn.leafletjs.com/leaflet-0.7.3/leaflet.css" />
</head>
<body>
    <div id="map"></div>
    <script src="http://cdn.leafletjs.com/leaflet-0.7.3/leaflet.js"></script>
    <script>
        var map = L.map('map').setView([34.41164, -119.86204], 13);
        L.tileLayer('https://{s}.tiles.mapbox.com/v3/{id}/{z}/{x}/{y}.png', {
            maxZoom: 18,
            attribution: 'Map data &copy; <a href="http://openstreetmap.org">OpenStreetMap</a> contributors, ' +
                        '<a href="http://creativecommons.org/licenses/by-sa/2.0/">CC-BY-SA</a>, ' +
                        'Imagery © <a href="http://mapbox.com">Mapbox</a>', id: 'kclarke.l38ndpcg'
        }).addTo(map);
        L.circle([34.41164, -119.86204], 500, {
            color: 'red',
            fillColor: '#f03',
            fillOpacity: 0.5
        }).addTo(map).bindPopup("I am a circle.");
    </script>
</body>
</html>
Presteps, then load page as source
Short step to Web Mapping Services
Summary

• Many past distribution and reproduction systems, based on ink and paper
• Still much offset lithography, but with digital and photo composition and separation, very low cost
• Since the Internet, possible to create, publish in one step
• Many tools and environments for doings so
• Model needs server, content, software or scripting and users
• Social media and web publishing ARE the new paper
• Advantages: real time, animation, feedback, low cost
• Massive growth industry!