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
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
OSM map parties

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

Sponsored by Social Media Exchange
Separations

A

Digital map file → Map → Printing plate (positive)

B

Digital map file → Film negatives (color separations) → 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

Copyright © 2009 Pearson Prentice Hall, Inc.
Dot screening
Density, screening
Pantone
Proofs

Digital Proofs
- Monochrome composite
- Color composite
- Overlay

Separation-Based Proofs
- Laminate
- Press check

Lowest → Cost and Quality → Highest

Copyright © 2009 Pearson Prentice Hall, Inc.
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

From Computer Desktop Encyclopedia
Reproduced with permission. ©2004 National Center for Supercomputing Applications

Welcome to NCSA Mosaic, an Internet information browser. Mosaic was developed at the National Center for Supercomputing University of Illinois in Urbana-Champaign, NCSA, The Board of Trustees of the University of Illinois U of I.
ArcView 1.0 1995
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
April 10th

Lecture 9: Color and its use

A link to a video is available here.

Sloom Chapter 10

April 20th

Lecture 8: Toponymy, typography, and map text

A link to a video is available here.

Sloom Chapter 11

April 25th

Lecture 10: Field Work

A link to the lecture slides is available here.
For example: GeoJSON is used by

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Examples</th>
</tr>
</thead>
</table>
| Point    | ```json
{  
  "type": "Point",
  "coordinates": [30, 10]
}
``` |
| LineString | ```json
{  
  "type": "LineString",
  "coordinates": [
  [30, 10], [10, 30], [40, 40]
  ]
}
``` |
| Polygon  | ```json
{  
  "type": "Polygon",
  "coordinates": [
  [[30, 10], [40, 40], [20, 40], [10, 20], [30, 10]]
  ]
}
``` |
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
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.
Example: ICM for UCSB
CartoDB: Cloud model
For example: Leaflet

Leaflet is a modern open-source JavaScript library for mobile-friendly interactive maps. It is developed by Vladimir Agafonikov with a team of dedicated contributors. Weighing just about 35 KB of JS, it has all the features most developers ever need for online maps.

Leaflet is designed with simplicity, performance and usability in mind. It works efficiently across all major desktop and mobile platforms out of the box, taking advantage of HTML5 and CSS3 on modern browsers while still being accessible on older ones. It can be extended with a huge amount of plugins, has a beautiful, easy to use and well-documented API and a simple, readable source code that is a joy to contribute to.

Used by: Flickr foursquare Pinterest craigslist Data.gov IGN Wikimedia OSM Meetup WSJ Mapbox CartoDB GIS Cloud ...
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
Based on Quick Start Example on Leaflet Website

```html
<!DOCTYPE html>
<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!