

# GUI DESIGN

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CSE416-S01 - Software Engineering

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## Session Objectives

- Consider the structure of your user interface based on the expectations of a typical user
- Understand the characteristics of random plans that a typical user might find “interesting”
- Understand how to measure the characteristics of random plans to identify “interesting” ones

This session should help with  
the organization of your GUI

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## Project

- Understand the implications of the potential Supreme Court dismissal of Section 2 of the Voting Rights Act (VRA)
- Typical users can be identified as groups that submitted amicus briefs

An amicus brief—meaning "friend of the court" (amicus curiae)—is a legal document filed in a lawsuit by non-parties (people or organizations) with a strong interest in the matter, aiming to influence the court's decision, provide specialized expertise, or outline the real-world consequences of a potential ruling

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## Louisiana v. Callais

- Challenge to Louisiana's 2024 Congressional district plan which includes 2 majority-black districts
- Following the 2020 census, Louisiana drew a plan containing 1 majority-black district
- 2020 plan struck down for violating the VRA and a new plan with 2 majority-black districts passed in 2024
- Claim that the new plan potentially violated the 14<sup>th</sup> Amendment Equal Protection Clause
- Claim that the 2024 plan constitutes an illegal racial Gerrymander

no state shall "deny to any person within its jurisdiction the equal protection of the laws"

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## Concerned Groups ...

- Supporting the VRA-compliant district plan
  - Civil-rights groups, the League of Women Voters, Lawyers' Committee, Brennan Center, Campaign Legal Center, Louisiana Legislative Black Caucus, et al
  - Claims that compliance with VRA Section 2 is not discriminatory and requires satisfaction of the Gingles test
  - Claims that the new plan balances other redistricting priorities

VRA-Constrained ReCom was not directly used in developing the 2024 Louisiana plan

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## ... Concerned Groups

- Groups attacking the 2024 plan
  - Project on Fair Representation, Judicial Watch, Alabama and other states, Pacific Legal Foundation, America First Legal, Landmark Legal Foundation
  - Claims that Section 2, as applied, risks becoming a racial quota or proportionality rule
- Middle ground groups urge the Court to clarify VRA-related districting standards

Many district plans in pre-clearance states contain opportunity districts in which a majority (often a large majority) of the population is African-American

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## Types of Project Users

- Groups defending a plan (not just Louisiana)
- Groups attacking a plan (not just Louisiana)
- Legal professionals (e.g., judges, civil rights attorneys, et al)
- State legislators developing a new plan in their state
- State legislators considering state VRA legislation

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## What Would Users Want to See

- Details of the state
  - Population
  - Demographics
  - Minority geographic distribution
  - Current plan
  - Current representatives (party, demographics, etc.)
- VRA applicability in a state
- Agreement of current/proposed plan with group goals
- Likely effect of VRA Section 2 disallowance (for SC judges)
- Example of a recommended plan (for groups)
  - Consistent with group goals
  - Satisfying other legal requirements

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## Redistricting Considerations

- Contiguity
- Split counties/Respect for political boundaries
- Competitive districts/protection of incumbents
- Equal population
- Communities of interest
- Compactness
- Others, depending on state legal requirements

It is virtually impossible to create districts that satisfy all these considerations

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## What Makes a Random Plan “Interesting”?

- Compliance with legal requirements
  - Contiguity
  - Equal population
  - Compactness
- Expected split (Republican/Democratic) – extreme or proportional
- Protection of incumbents (one party or both) – includes pairing of incumbents
- Many/few minority-effective districts
- Presence/absence of majority-minority districts (and degree of majority)
- Similarity to current plan

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## How to Determine an “Interesting” Plan

- Contiguity and equal population – ReCom default
- Capable of being measured during ReCom
  - Compactness
  - Expected split (Republican/Democratic)
  - Protection of incumbents
  - Minority-effective districts
  - Similarity to current plan (not required)
  - Majority-Minority percentage

You have already generated most of this data

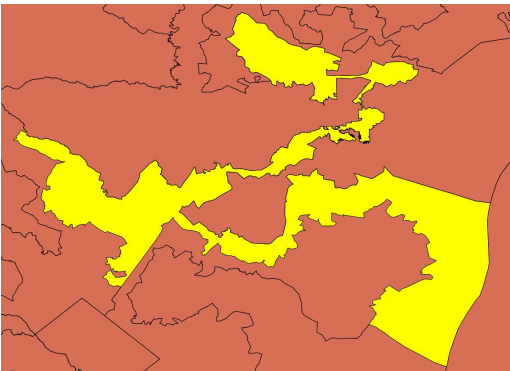
You will discuss the rationale for “interesting” plans during your final project presentation

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## Compactness

- Required by approximately 40 states
- Best understood by people engaged in redistricting
- Courts tend to comment that oddly shaped districts indicate Gerrymandering
- Not a single best measure
- Measures usually a ratio of two measures (e.g., area vs bounding area)
- Most intuitive is the Polsby Popper measure (measure of perimeter vs. area)



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## Geometric Compactness

- We can measure compactness (e.g., circle, square, or rectangle)
  - Measures (Reock, Polsby-Popper, Convex Hull)
  - Best understood by people engaged in redistricting
  - Polsby-Popper
    - Most used/referenced
    - $= 4 * \pi * D_A / (D_P)^2$ , where  $D_A$  is the area of district D and  $D_P$  is the perimeter of district D
    - Can be a computationally expensive calculation for congressional districts because the perimeter has many edges
    - Penalizes districts that feature a natural jagged boundary
- A Polsby-Popper score below .3 is considered non-compact

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## Protection of Incumbents

- A projected vote share difference of 10% or less is considered competitive
- Data available when you compute an expected winning party in the SeaWulf election simulation
- You might consider incumbent pairing by guessing the geolocation of incumbents (actual data not easily available)

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## Similarity to Current Plan

- Requires
  - A match of districts in a random plan with current districts
  - A calculation of similarity
- Similarity can be calculated as
  - Geography – using calls to Shapely or
  - Population – look for precincts in both districts and measure population in those precincts divided by current district population

You have not currently calculated this, but if you opt for this measure, it will be added to the use case list

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## Majority-Minority Districts

- Districts in which the population of a minority group is greater than 50%
- Could indicate packing
- Supreme court could consider such plans a racial Gerrymander in violation of the Equal Protection clause
- Groups in support of minorities might favor minority-effective districts that were not majority-minority

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## VRA Update – April 29, 2026

- Supreme Court struck down the Louisiana 2024 Congressional map that had created a 2nd majority-black district
- Split 6/3 along partisan lines (Kagan, Sotomayor, and Jackson dissented)

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## Supreme Court Finding

- 2024 Louisiana map was an unconstitutional racial Gerrymander
- Section 2 liability exists only when the evidence supports a strong inference that the state **intentionally** drew districts to give minority voters less electoral opportunity because of race
- Rejected the idea that disparate electoral results alone can require a race-conscious remedy

Decision reverses the 1982  
VRA “intent” doctrine

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## Consequence of Louisiana v. Callais

- Intent is very difficult to prove
- A racial Gerrymander in racially polarized state can easily be described as a political Gerrymander, which is not justiciable by the court
- Racially polarized states will redraw Congressional maps as soon as possible
  - Some (e.g., Louisiana) in 2026
  - Most in 2028
- Early predictions are a loss of 19 African-American representatives

If 2026 primary elections have been concluded, it is impossible to redraw before 2028 election cycle

Current Congress is the most racially diverse – Pew Research

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## Possible Consequences

- Increased polarization of states
- Loss of minority representation in Congress
- Potential racial chaos
- Actions consistent with examples provided in the Levitsky/Ziblatt book

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# HOW DEMOCRACIES DIE

What History Reveals About Our Future

STEVEN LEVITSKY & DANIEL ZIBLATT

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## Reactions

- “We’re very likely to see the biggest drop in minority representation of the modern era — maybe even bigger than the drop we saw in the end of Reconstruction,” – Nick Stephanopoulos, Harvard
- “The Supreme Court today returned the Voting Rights Act to its original intent, which was to protect against intentional racial discrimination,” – James Blair, President Trump Political Operations Head
- “I’ve vowed to keep Tennessee a red state, and as Governor, I’ll do everything I can to make this map a reality,” – Sen. Blackburn, Tennessee
- Governor Landry (Louisiana) announced he will suspend Map primaries so the state can be redistricted

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## Possible Legislation

- John Lewis Voting Rights Act
  - Would restore and strengthen parts of the VRA (e.g., pre-clearance)
  - 2021 – passed in House, but short of 60 votes in Senate
- Fair Representation Act
  - Would institute multi-member districts with ranked choice voting
  - Reintroduced in 2025
  - Would significantly reduce partisan and racial Gerrymanders

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## Changes to Use Case List

- Importance of extreme district plans in states with one-party control over districting
  - Addition to GUI use case
  - Calculation and display of expected change in representatives resulting from the Supreme Court ruling. Base your estimate on the most extreme results in the ensembles
- Calculation of estimate of racially polarized voting
- Possibly others

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## Have You Satisfied the Objectives?

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