Final Project: Topic Proposal

CEVE 421/521

2026-01-30

1 Overview

Due: Friday of Week 3

This proposal confirms your team and document choice. The goal is to ensure your chosen plan contains enough decision-relevant content for a meaningful audit.

A good topic proposal sets you up for success on all subsequent deliverables. Spending time now to find the right document will make Memos 1-3 much easier to write.

2 Choosing a Plan: The Key to Success

The single most important decision you'll make is **which plan to audit**. A well-chosen plan will give you rich material for analysis; a poor choice will leave you struggling to find content for your memos.

2.1 What Makes a Good Plan?

Your document should be:

1. **Decision-Relevant:** The plan should contain specific, concrete decisions—not just aspirational goals. Look for plans that answer "what will we build?" or "how much will we invest?" rather than just "what do we hope to achieve?"
2. **Analytically Rich:** The plan should contain enough technical detail for you to critique. You need to be able to identify models, data sources, and assumptions.
3. **Appropriately Scoped:** The plan should be substantial enough for a semester-long project (typically 50+ pages) but focused enough to analyze thoroughly.
4. **Publicly Available:** You must be able to share the document and cite specific page numbers.

2.2 Types of Documents That Work Well

Document Type	Why It Works	Example
Flood Risk Management Plans	Clear decisions (levee heights, buy-outs), quantified metrics (damages avoided), explicit models (hydraulic, economic)	US Army Corps feasibility studies

Document Type	Why It Works	Example
Coastal Resilience Strategies	Multiple levers (seawalls, living shorelines, retreat), scenario analysis, benefit-cost calculations	State coastal master plans
Climate Action Plans with Infrastructure Components	Specific projects with costs, timelines, and expected outcomes	City infrastructure adaptation plans
Hazard Mitigation Plans	Required to include risk assessment, mitigation actions, and benefit-cost analysis	FEMA-approved local hazard mitigation plans

2.3 Types of Documents That Do NOT Work Well

Document Type	Why It Fails	Red Flags
Aspirational Climate Pledges	Goals without actions; no analysis to critique	"Net zero by 2050" with no implementation pathway
Policy Frameworks	Describes what others should do, not what the organization will do	"Stakeholders should consider…"
Short White Papers	Not enough depth for sustained analysis	Under 30 pages; no technical appendices
Purely Qualitative Reports	No models or quantitative analysis to evaluate	No numbers, maps, or projections
Academic Papers	Already peer-reviewed; your role is to audit practitioners	Published in journals

2.4 Where to Find Good Plans

Federal Sources:

- **USACE (Army Corps):** Feasibility studies, post-flood reports, and flood risk management plans are excellent choices. Search "USACE [city name] feasibility study" or browse the USACE Digital Library.
- **FEMA:** Hazard Mitigation Plans are publicly available. Check your state's emergency management agency website.

State Sources:

- **Louisiana Coastal Master Plan:** A gold-standard example of decision-relevant climate planning.
- **Texas General Land Office:** Coastal resilience studies
- **State climate adaptation plans:** Quality varies; look for ones with specific projects and costs.

City/Regional Sources:

- Major cities often have climate action plans, but quality varies widely.
- Look for plans that include infrastructure investments with cost estimates.
- Regional planning agencies (e.g., Houston-Galveston Area Council) often produce more technical documents.

International Sources:

- Netherlands Delta Programme
- UK Environment Agency flood risk assessments
- World Bank climate adaptation project appraisals

2.5 A Decision Checklist

Before committing to a document, verify you can answer "yes" to all of these:

- ☐ Can I identify at least 3 specific decisions (levers) the plan makes?
- ☐ Does the plan include quantitative targets or metrics?
- ☐ Can I find evidence of models or analysis (not just assertions)?
- ☐ Is the full document available online?
- ☐ Is the document substantial enough (50+ pages) for a semester project?
- ☐ Does the plan address climate hazards (flooding, sea level rise, extreme heat, etc.)?

3 The XLRM Framework: Finding the Structure

The XLRM framework helps you systematically analyze any decision problem:

- **X (Uncertainties):** Factors outside the decision-maker's control that affect outcomes
- **L (Levers):** Decisions or actions the decision-maker can take
- **R (Relationships):** Models, assumptions, and causal links connecting levers to outcomes
- **M (Metrics):** Quantifiable measures used to evaluate success

Your proposal should demonstrate that your chosen plan contains all four components.

3.1 Identifying Uncertainties (X)

Uncertainties are factors that:

- Affect outcomes but are not controlled by the decision-maker
- Could take on different values or unfold in different ways
- May be acknowledged explicitly or hidden in assumptions

Examples of Uncertainties:

Category	Examples	What to Look For
Climate	Future sea level rise, storm intensity, precipitation patterns	Scenario tables, climate projections, "under RCP 4.5…"
Socioeconomic	Population growth, land use change, economic development	Demographic projections, development scenarios
Technical	Infrastructure performance, model accuracy, failure modes	Sensitivity analyses, uncertainty ranges, caveats
Economic	Discount rates, future costs, property values	Assumptions stated in BCA, "assuming 3% discount rate"

How to Find Them:

- Look for words like "scenario," "projection," "assumption," "uncertainty," "may," "could"
- Check appendices for sensitivity analyses or scenario descriptions
- Note when the plan uses single values vs. ranges

Common Mistake: Listing "climate change" as an uncertainty. Be more specific: *which aspect* of climate change? (e.g., "sea level rise between 1-4 feet by 2100")

3.2 Identifying Levers (L)

Levers are actions that:

- The decision-maker can choose to take (or not take)
- Have associated costs and consequences
- Come in different options or magnitudes

Examples of Levers:

Category	Examples	What to Look For
Structural	Levee heights, seawall design, drainage capacity	Engineering specifications, design parameters
Non-structural	Buyouts, zoning changes, building codes	Policy recommendations, program descriptions
Financial	Insurance requirements, grant programs, tax incentives	Budget allocations, program designs
Operational	Warning systems, evacuation plans, maintenance schedules	Operational protocols, trigger levels

How to Find Them:

- Look for "the plan recommends," "we will construct," "the preferred alternative"
- Find chapters on "alternatives considered" or "options analysis"
- Note any decision points where different choices were possible

Common Mistake: Confusing goals with levers. "Reduce flood risk" is a goal; "construct a 12-foot levee" is a lever.

3.3 Identifying Relationships (R)

Relationships describe:

- How levers connect to outcomes (causal mechanisms)
- Models used to predict consequences
- Assumptions about how systems behave

Examples of Relationships:

Category	Examples	What to Look For
Hazard Models	Flood frequency analysis, storm surge models, climate downscaling	Model names (ADCIRC, HEC-RAS), data sources

Category	Examples	What to Look For
Exposure Models	Building inventories, population projections, land use maps	GIS data, parcel databases, census data
Vulnerability Models	Depth-damage curves, fragility functions, casualty rates	HAZUS, custom damage functions
Economic Models	Benefit-cost analysis, present value calculations	Discount rates, project lifetimes, valuation methods

How to Find Them:

- Look for methodology sections, technical appendices, model descriptions
- Find references to software tools or analytical frameworks
- Note how the plan goes from "if we build X" to "we expect Y reduction in damages"

Common Mistake: Describing data as relationships. "FEMA flood maps" is a data source; the *relationship* is "we assume the 100-year floodplain represents 1% annual probability of flooding."

3.4 Identifying Metrics (M)

Metrics are:

- Quantifiable measures of outcomes
- Used to compare alternatives or evaluate success
- Defined with specific units and calculation methods

Examples of Metrics:

Category	Examples	What to Look For
Risk Metrics	Annual expected damages, lives at risk, properties flooded	Dollar amounts, counts, probabilities
Economic Metrics	Net present value, benefit-cost ratio, internal rate of return	BCA results, ranking of alternatives
Performance Metrics	Level of protection, residual risk, reliability	Design standards, performance targets
Equity Metrics	Distribution of benefits, vulnerable populations protected	Demographic analysis, spatial distribution

How to Find Them:

- Look for tables comparing alternatives
- Find "success criteria" or "evaluation criteria" sections
- Note any targets or thresholds the plan sets

Common Mistake: Confusing metrics with goals. "Resilient communities" is a goal; "properties removed from the 100-year floodplain" is a metric.

4 Proposal Requirements

Submit a **1-page document** (PDF) containing:

4.1 1. Team Information

- Team member names and whether each is enrolled in CEVE 421 or 521
- Brief statement of how you plan to divide work (e.g., "Team member A will lead Memo 1; member B will lead Memo 2…")

4.2 2. Document Selection

Provide complete citation information:

- **Title:** Full title of the document
- **Organization:** Who published it (agency, city, consultant)
- **Year:** Publication date
- **URL:** Direct link to the PDF or landing page
- **Summary:** 2-3 sentences describing what the plan addresses and why you chose it

4.3 3. Initial XLRM Mapping

Identify at least **two examples of each** XLRM component. For each example, provide:

- A brief description (1-2 sentences)
- A page number reference so we can verify

Component	Example 1	Example 2
X (Uncertainties)	*e.g., "Sea level rise scenarios of 1, 2, and 4 feet by 2100 (p. 23)"*	*e.g., "Population growth projections from 1.2M to 1.8M by 2050 (p. 45)"*
L (Levers)	*e.g., "Structural alternatives: 100-year vs. 500-year levee design (p. 67)"*	*e.g., "Non-structural: voluntary buyout program for repetitive loss properties (p. 89)"*
R (Relationships)	*e.g., "HEC-RAS hydraulic model to estimate flood depths (Appendix C)"*	*e.g., "HAZUS-MH depth-damage curves for residential structures (p. 112)"*
M (Metrics)	*e.g., "Annual expected damages in $ millions (Table 5-1)"*	*e.g., "Benefit-cost ratio for each alternative (Table 6-2)"*

4.4 4. Confirmation Statement

A brief statement (1-2 sentences) confirming that:

- The document is publicly available (provide URL)
- The document contains concrete decisions (not just aspirational goals)
- Your team has reviewed the full document (not just the executive summary)

5 Example: Strong vs. Weak Proposals

5.1 Strong Proposal Example

Document: Harris County Flood Control District, *Buffalo Bayou and Tributaries Resiliency Study* (2021). [Link to document]

Summary: This USACE feasibility study evaluates structural and non-structural alternatives for reducing flood risk in the Buffalo Bayou watershed following Hurricane Harvey. We chose this document because it contains detailed BCA for multiple alternatives and explicitly addresses climate uncertainty.

Component	Example 1	Example 2
X	Sea level rise scenarios (0.5-2.0 ft by 2085, p. 34)	Future land use scenarios (p. 67)
L	Tunnel alternative vs. channel modification (p. 89)	Voluntary buyout of 2,300 structures (p. 102)
R	HEC-HMS rainfall-runoff model (Appendix D)	USACE depth-damage curves (p. 156)
M	Expected annual damages ($890M baseline, p. 45)	BCR ranging from 0.8 to 3.2 (Table 7-1)

5.2 Weak Proposal Example

Document: City of Houston Climate Action Plan (2020)

Summary: Houston's plan to reduce emissions and adapt to climate change.

Component	Example 1	Example 2
X	Climate change	Future weather
L	Reduce emissions	Build resilience
R	City analysis	Expert input
M	Net zero by 2050	More resilient city

Why is this weak?

- No page numbers (evidence team didn't read document carefully)
- Examples are too vague to verify
- "Reduce emissions" is a goal, not a specific lever
- "Net zero by 2050" is a target, not a metric for evaluating alternatives
- No URL provided

6 Submission

Submit your proposal as a PDF to Canvas by 11:59 PM on the due date.

Filename format: `TeamName_TopicProposal.pdf`

7 Grading

This proposal is graded **Complete/Incomplete**.

A **Complete** proposal demonstrates:

- ☐ Clear document selection with full citation and working URL
- ☐ At least two plausible, specific examples for each XLRM component
- ☐ Page number references for each example
- ☐ Evidence that the team has reviewed the full document

An **Incomplete** proposal will be returned for revision if:

- Examples are too vague or cannot be verified
- The document appears to lack decision-relevant content
- Page references are missing
- The document is not publicly accessible

You will have one opportunity to revise an incomplete proposal within 48 hours.

8 Tips for Success

1. **Start Early:** Finding the right document takes time. Don't wait until the night before to search.
2. **Skim Before Committing:** Read the executive summary AND flip through the full document. Many plans have great summaries but thin analysis.
3. **Check the Appendices:** The best material is often in technical appendices. A plan with detailed appendices is usually a good sign.
4. **Look for Tables:** Plans with tables comparing alternatives (costs, benefits, BCRs) are usually analytically rich.
5. **Consider Your Interests:** You'll spend the semester with this document. Pick something you find genuinely interesting—your hometown, a hazard you care about, an engineering solution that fascinates you.
6. **Ask Early:** If you're unsure whether a document will work, email the instructor *before* the deadline. We can quickly tell you if it's a good choice or suggest alternatives.

Bibliography