Phase 1 Discover

DAEN 460 Capstone Senior Design

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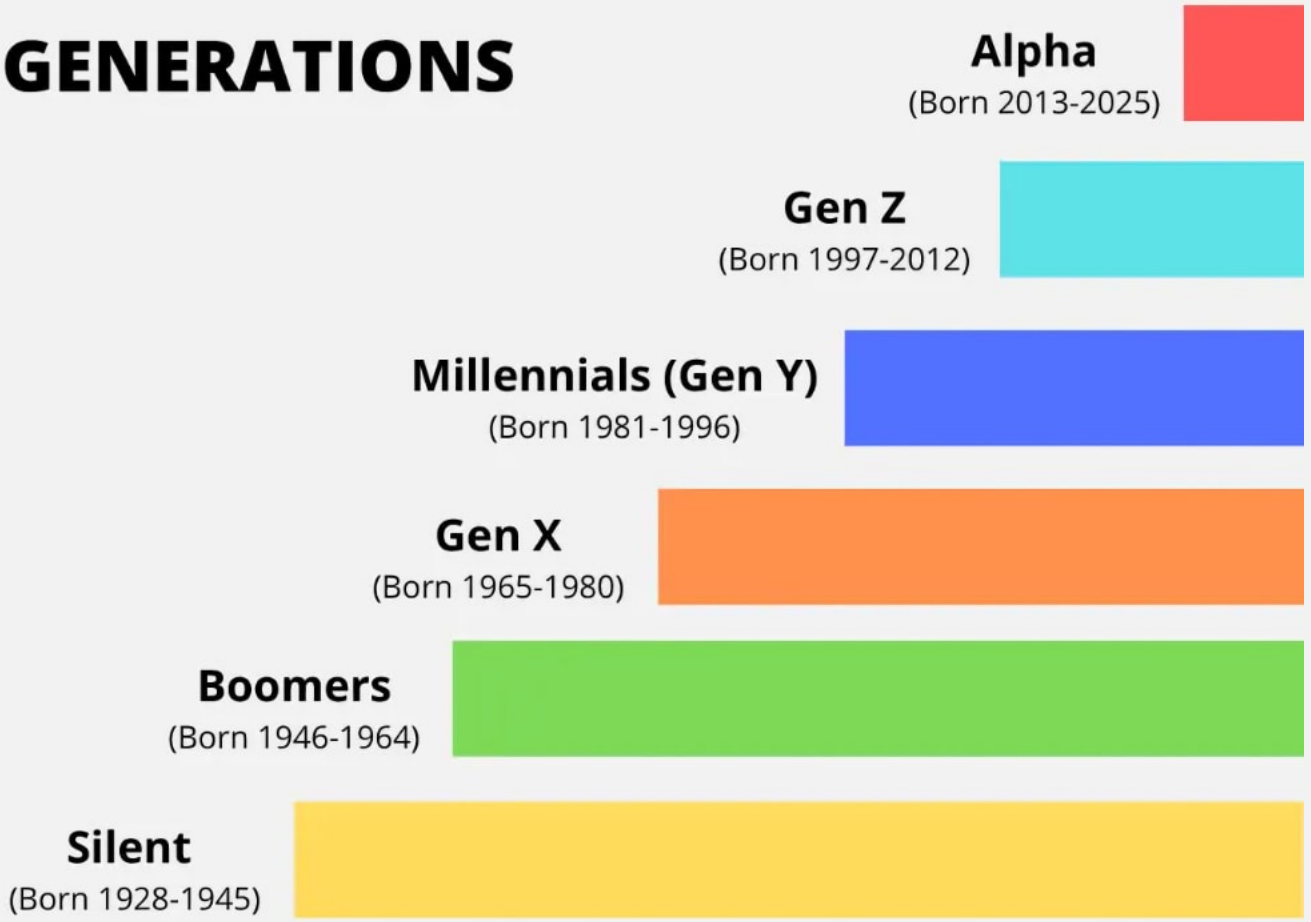
Spring 2026

ENGINEERING
TEXAS A&M UNIVERSITY

GENERATIONS



Bosses are firing Gen Z grads just months after hiring them

- After two years of complaints, employers are now *acting*.
  Many are terminating Gen Z hires within months of onboarding.
- **Top concern?**

Bosses are firing Gen Z grads just months after hiring them

- After two years of complaints, employers are now *acting*.
  Many are terminating Gen Z hires within months of onboarding.
- **Top concern?**

  Lack of motivation and initiative
  (50% of managers cite as the primary reason for termination)
- Other major issues reported:
  - Unprofessional behavior,
  - Poor organization,
  - Weak communication skills.
- Practical workplace challenges include:
  - Frequent lateness to work and meetings,
  - Inappropriate office attire,
  - Use of unsuitable language in professional settings.

Ref.:
https://fortune.com/article/why-are-companies-firing-gen-z-employees-workplace-bosses-workers-jobs/
https://www.cnbc.com/2025/12/08/how-recent-grads-are-dealing-with-the-shrinking-pool-of-entry-level-jobs.html

- Critique your own project against **learning goals** rather than technical checklists only!
- You are not being graded on reproducing a solution but on the **quality of your thinking and decisions**!
- Peers are not parallel workers, but as part of a **shared system**. Shift the culture from individual performance to collective responsibility and make **collaboration** (not cooperation only)!
- **Metacognition** …
  why I'm thinking what I'm thinking → make the invisible visible!

Today's Agenda

- **Sponsor Meetings and Project Advice**
- **Communication Team**
- **Phase 1 Discover**
  & Presentation Guidelines
- **Mini Project Management Packet**
- **Gantt Chart**

Sponsor Meeting

How about **feedback** from last semester?

- *What went well?*
- *What do you wish you'd done prior to the meeting that you did not?*
- *Did all the team get to introduce themselves?*
- *Were your expectations met for the next meeting?*
- *Did you identify some needed information and establish a target date?*
- *Did you set a follow-up meeting or recurring meeting?*
- *What can be improved?*

Sponsor Meeting Tips

Be prepared

- Agenda prepared and sent ahead of time
- Team knows who will speak and on what topic
- Questions prepared
- Team member(s) assigned to take notes (record audio/video only if sponsor agrees)

Listen more than you speak

- Wait for sponsor to answer questions, don't interrupt with additional questions
- Don't try to provide immediate solutions, this is still a semester long project

Sponsor Meeting Tips

Ask for clarification on anything you don't understand

- Ask for meaning of any terms or acronyms the sponsor uses! Don’t assume your teammates will know!
- Don't pretend to understand something you don’t.

End the meeting with plans

- Action items for team or sponsor with target dates.
- Next meeting date set or proposed.

Sponsor Meeting Tips

Remain positive and upbeat throughout the project

- Not everything will go perfectly,
  don't expect it to and don't get down when it doesn’t.
- Never talk bad about anyone;
  sponsor, team member, instructors (especially).

If someone needs to miss a meeting

- Make sure the sponsor knows why,
  explain at the start of the meeting that … can't make it because … .
- Make sure to follow up with person that missed to distribute information or action items!

Sponsor Meeting Tips

Ensure meetings don't go longer than allotted

- Listen for clues sponsor needs to go ("well, that about wraps it up…", "OK, if there isn't anything else…", etc.)
- and, not meeting related *but*:

Don't be afraid to call the sponsor if emails are not answered and you need answers

- Set target dates for required information and follow up,
- If you call and they don't answer, leave a voicemail.

Sponsor Meeting Tips *You'll be surprised by the doors this can open...* !

- Dress **appropriately** (*ask if in doubt*) https://careercloset.tamu.edu/
- Phone on **silent mode** and **don't use it**,
- Follow all **safety rules** (and instructions),
- **Ask** before taking photos or videos,
- **Document** who you meet with,
- You are representing **Texas A&M**, be a good example!

Team Dynamics

1. You are called a team for a reason

- You have the same goals
- You each have skills and abilities

2. Share the load

- No one gets a free pass
- Work independently but together

Team Dynamics

3. Recognize and acknowledge differences

- Compromise
- Use individual strengths to make the team better

4. If you have difficulty

- Try to work things out together (don't talk bad about anyone!)
- Contact instructor team for assistance only if you can't work it out

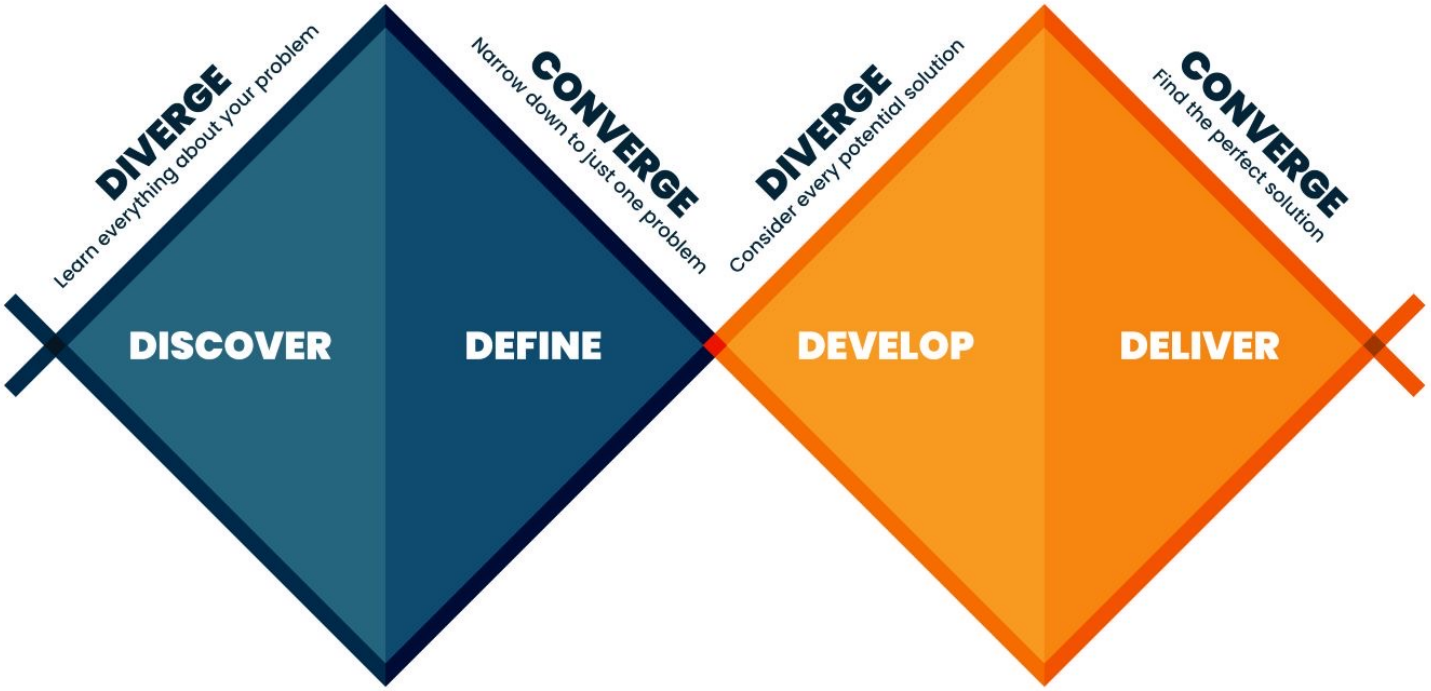
Faculty Advisor

- If you have not identified yet a potential faculty advisor, do it ASAP!
- For areas of research interest/expertise, consult the ISEN website, follow research tab to Research Fields.
- Your project does not need to perfectly align with a professor's research field, but they are more likely to accept if it is something that interests them.


COMMUNICATION

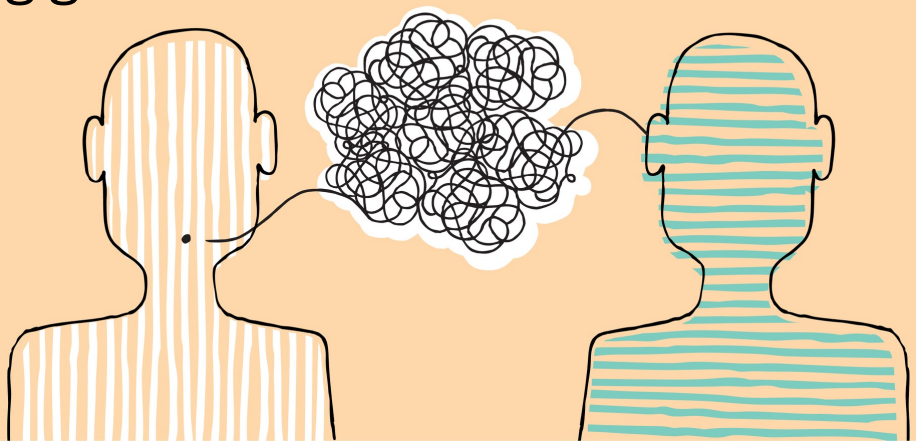
Phase 1 Discover

- Phase 1 will **set the direction** for your project.
- Phase 1 is **not about solutions;**
  it is about the problem/opportunity.



Phase 1 Discover

- Phase 1 will **set the direction** for your project.
- Phase 1 is **not about solutions;** it is about the problem/opportunity.
- Some **primary goals** for Phase 1 include
  - **Information gathering,**
  - **Problem definition,**
  - **Client needs identification,**
  - **Technical objectives development.**
- Establishing good/effective communication is also a goal!



Information Gathering

- Will occur continuously throughout the project, but critical at beginning.
- Necessary for defining parameters and scope of project.
- Information can include (but not limited to)
  - Sponsor company,
  - Industry/market,
  - Competitors,
  - **Standards/Constraints** that guide or limit the solution (ABET).
- Sources can include
  - Sponsor, trade publications or other public published material, internet.
- **The goal of Phase 1 is to gather as much information as possible,** even if you're not sure it's relevant.

Problem Definition

- Should be a **concise statement** of the problem facing your sponsor
  - Focus on the source of the problem,
    not the symptoms or solution,
  - Keep the language simple, avoid technical jargon,
  - Avoid detail, that will be fleshed out with customer needs.
- Done **in conjunction** with *Information Gathering*.

Problem Definition (Example)

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Good:
The Radiology Department at Texas A&M Hospital experiences prolonged imaging turnaround times due to inefficiencies in the order processing workflow, resulting in delayed clinical decision-making.

Not so good:
The Radiology Department at Texas A&M Hospital has many problems with imaging, staff availability, communication between departments, patient flow, and rising costs, which together negatively impact hospital efficiency and patient satisfaction.

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The Radiology Department at Texas A&M Hospital experiences prolonged imaging turnaround times due to inefficiencies in the order processing workflow, resulting in delayed clinical decision-making.

- **Focuses** on a single, primary process (order processing workflow)
- Names one **measurable** outcome (imaging turnaround time)
- **Avoids mixing** staffing, length of stay, and cost into the core problem
- Creates a **clear target** for data collection and pipeline design

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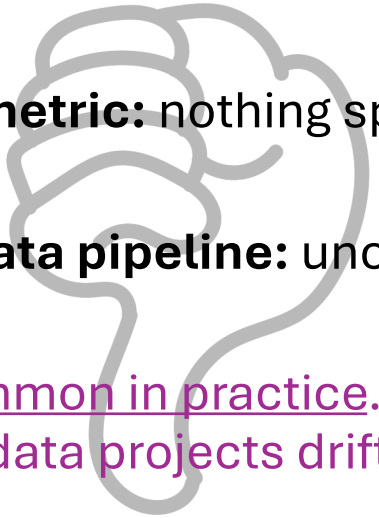
The Radiology Department at Texas A&M Hospital has many problems with imaging, staff availability, communication between departments, patient flow, and rising costs, which together negatively impact hospital efficiency and patient satisfaction.

- **Too broad:** bundles multiple domains (staffing, communication, flow, cost, satisfaction)
- **No clear process focus:** unclear what system or workflow should be instrumented
- **No measurable primary metric:** nothing specific to optimize or monitor
- **Hard to translate into a data pipeline:** unclear what data to collect, where, or why



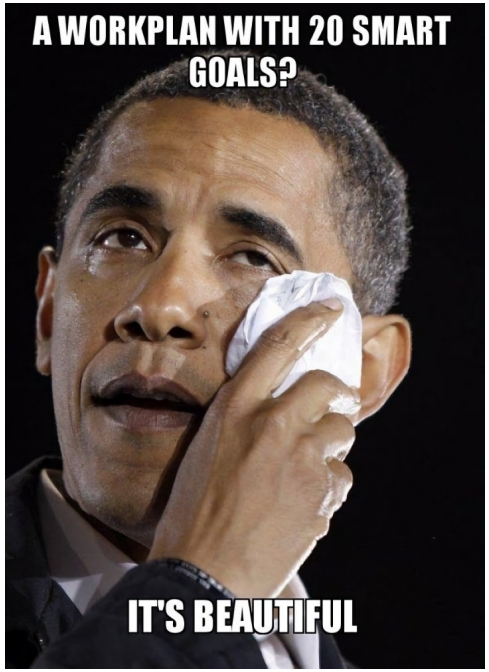
This kind of statement is common in practice.
And it's exactly what makes data projects drift or fail.

Client Needs

- Likely discovered as part of problem definition development, but this allows you to expand on the problem definition with **statements of specific needs**
- Should be a **list of things** in clear, unambiguous, non-technical terms
- May be **provided directly by the sponsor** or you may need to solicit and/or **interpret them from conversations** and other research
- Number client needs for identification in **traceability** matrix
- The client needs…
  - **N1**: Awareness of data quality, security, and compliance risks
  - **N2**: Limited exposure to corrupted, incomplete, or inconsistent data in production systems
  - **N3**: A standardized process to increase adoption and correct usage of data pipelines and tools
  - **N4**: Fewer system and pipeline failures, reducing operational downtime

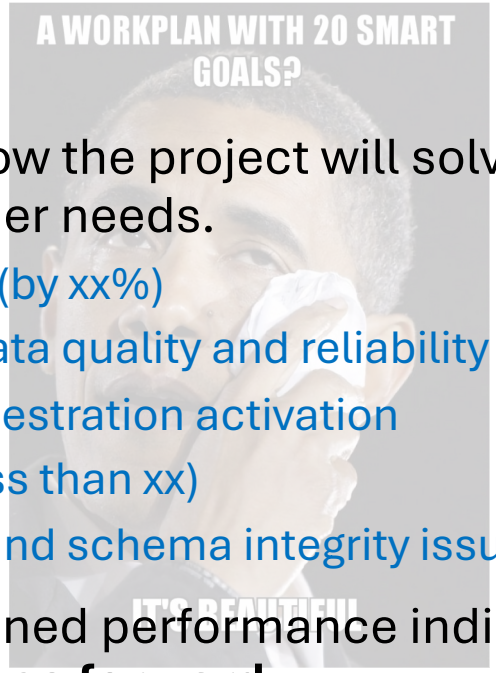
Technical Objectives

- Technical objectives should translate the customer needs and problem definition into actionable, measurable goals.
- Each objective should be **Specific**, **Measurable**, **Achievable**, **Relevant**, and **Time-bound** (SMART).



Technical Objectives

- Technical objectives should translate the customer needs and problem definition into actionable, measurable goals.
- Each objective should be **Specific**, **Measurable**, **Achievable**, **Relevant**, and **Time-bound** (SMART).
- Number TO's for **traceability** purposes.
- Technical objectives **should address** how the project will solve the defined problem and satisfy the customer needs.
  - **TO1**: Reduce data pipeline failure rates (by xx%)
  - **TO2**: Increase engineer awareness of data quality and reliability risks
  - **TO3**: Improve automated workflow orchestration activation
  - **TO4**: Decrease system downtime (to less than xx)
  - **TO5**: Eliminate identified data leakage and schema integrity issues
- At this point your TO's may not have defined performance indicators, but **they will evolve as the project moves forward**.



Technical Objectives for Open-ended Research Projects

Your goals should center around developing **knowledge**, **frameworks**, and **methodologies** that help answer key questions or inform **decision-making**.

- If your project is more research-focused, your objectives **may not have** quantifiable performance improvement criteria.
- For research-driven projects, technical objectives should:
  - **Define Key Questions**
    What are you trying to **discover**, **validate**, or **understand**?
  - **Establish Analytical Frameworks**
    What **methods**, **models**, or **simulations** will you develop?
  - **Characterize System Relationships**
    How do the **key factors** of your problem/system interact?
  - **Develop Conceptual or Qualitative Deliverables**
    What **frameworks**, **decision-support tools**, **methodologies**, or **documentation** will your team generate?

See the document posted on Canvas for examples.

Example

Research-Oriented Data Engineering Project Objectives

Suppose your team is studying data pipeline reliability in large-scale streaming systems. Your technical objectives might be:

- **Key Questions**
  - **What factors** most strongly influence end-to-end latency and data loss in a real-time streaming pipeline?
  - **How do different** buffering strategies affect system stability under peak load?
- **Analytical Frameworks**
  - **Develop a benchmarking framework** to simulate varying data arrival rates and system loads.
  - **Design experiments** using controlled workloads to compare multiple pipeline architectures.
- **System Relationships**
  - **Analyze how** ingestion rate, buffer size, and processing throughput interact to produce bottlenecks.
  - **Model the relationship between** fault frequency and recovery time.
- **Conceptual or Qualitative Deliverables**
  - **Produce a decision framework that guides engineers** in selecting buffering and checkpointing strategies.
  - **Create documentation that outlines best practices** for designing resilient streaming pipelines.

Traceability

- Traceability will ensure that your project is **on track** to meet your technical objectives.
- At this point you should connect defined client needs to technical objectives in a **traceability matrix**.
- Client needs will likely not map one-to-one to technical objectives, but **all client needs should map to at least one technical objective**.

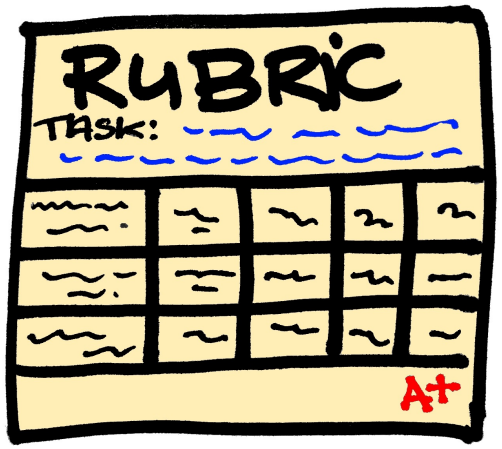
Client Needs (N)	Technical Objectives (TO)
N1	TO1, TO3, TO6
N2	TO2, TO4
…	…

Phase 1 Presentation Guidelines

- Presentation guidelines document is posted on Canvas.
- Provides **general guidelines** on how and what to present, but your project should guide the content.
- Do not try to present everything you've learned so far **(time is limited).**
- Appendix is for information you've gathered that might be relevant:
  - Reference information as necessary in presentation,
  - Don't present appendix slides,
  - Technical grade for Information Gathering **will be** partially based on appendix content.
- **Practice** your presentation, both individual parts and as a team!

Phase 1 Presentation Rubric

- Built into Canvas assignment,
- Primary instructor will provide input/feedback,
- Half of the missed points can be recovered by resubmitting the content.



Mini Project Management Packet

- It demonstrates how the project will be **planned**, **governed**, **executed**, **monitored**, and **communicated** in a professional data engineering environment.
- It extends your Fall semester project charter and confirms your team's ability to manage **scope**, **risk**, **quality**, and **delivery** in addition to building the pipeline.
- It defines what will be done as technical objectives.
- Due date is prior to Phase 2 kickoff.

Gantt Chart

- See documents posted on Canvas.
- Make the chart useful for your project, **don't just do it to check a box!**