Instructions:

The chat history has been segmented into several modules; each corresponding to how the WildfireGPT is responding to the user:

**User profile module**: WildfireGPT asks the user clarifying questions to guage the user’s concern and understanding

**Planning module**: WildfireGPT creates a plan to communicate how the rest of the conversation is going to pan out.

**Memory & Toolbox Modules**: from the user’s viewpoint, this means the WildfireGPT is now capable of retrieving data and scientific literature to help the user

For each module, there will be a few questions to help you evaluate the quality of the experience with WildfireGPT; please provide as detailed feedback as you can. Also, feel free to add (to) limitation sections.

*Please be as critical as you can!*

User Profile Module

User: I am a risk manager developing urban development plans for 2050  
  
Assistant: That’s interesting! How do you think wildfires and climate change might impact your risk management planning for urban development? 🏙️

User: We are concerned with housing at the wildland urban interface  
  
Assistant: Got it. In what ways do you envision wildfires and climate change affecting housing at the wildland-urban interface? 🏡🔥

User: Will risk of the housing units increase or decrease in the future?  
  
Assistant: Good question! The interaction between wildfires and climate change could lead to both an increase in the frequency and intensity of wildfires, resulting in higher risk for housing units. How do you think this increased risk could be managed? 🏡🔥

User: I don’t know  
  
Assistant: Understood. It’s a complex issue, and finding solutions can be challenging. Are there any other specific aspects related to wildfires and climate change that you’re interested in learning about?

User: We are developing plans for Las Vegas, NM  
  
Assistant: Thank you for sharing that. Can you tell me more about the specific challenges and considerations related to wildfires and climate change in the context of developing plans for Las Vegas, NM? What aspects of the development plans are affected by these factors? 🏗️🔥

User: We are concerned about wildfire impacts on water supply  
  
Assistant: Great! Thanks for sharing that. So, what specific concerns do you have about the impact of wildfires and climate change on urban development and housing at the wildland-urban interface? 🌆🔥

User: We are interested in what the average home owners can protect themselves in the event of wildfire and water supply shortages

Please answer the following:

1. **Clarity and Understandability**: Are the assistant's question clear and easy to understand for someone with the *user's background*? This involves assessing whether the language and terminology used are appropriate for a *risk manager* involved in urban development planning.

2. **Relevance of Questions**: How relevant are the questions asked by the assistant to the user's initial concern and subsequent details? This looks at whether the assistant's questions help delve deeper into the user's specific needs and concerns or if they diverge from the main topic.

3. **Engagement and Encouragement**: Does the assistant effectively engage the user and encourage further elaboration on their needs and concerns? This includes evaluating whether the assistant's responses are formulated in a way that makes the user feel heard and prompts them to share more detailed information. E.g. are there too many questions? Would you feel comfortable to say “I don’t know?”

4. **Profile**: Feel free to add your comments below.

Here is the user profile created by WildfireGPT:  
The user is interested in understanding the impact of wildfires and climate change on urban development and housing at the wildland-urban interface. They are seeking to explore the implications for risk management planning and housing development in areas prone to wildfires. Additionally, the user is interested in discussing specific challenges and considerations related to wildfires and climate change in the context of developing plans for Las Vegas, NM.

What did WildfireGPT miss? water supply; the perspective of an average homeowner

5. **Additional Comments**:

Planning Module  
  
Assistant: Sure! Here’s a step-by-step plan to effectively engage with you:

1. Understand Your Needs: I will start by discussing your specific concerns and priorities regarding the impact of wildfires and climate change on urban development and housing at the wildland-urban interface.
2. Data Interpretation: Once I have a clear understanding of your needs, I will interpret relevant data such as the Fire Weather Index (FWI), long-term fire history records, and recent fire incident data to assess the wildfire risk in the Las Vegas, NM area.
3. Research Academic Papers: I will research relevant academic papers to gather insights on best practices for risk management planning and housing development in wildfire-prone areas.
4. Recommendations: Based on the data interpretation and research findings, I will provide recommendations on specific challenges and considerations for developing plans in Las Vegas, NM, considering wildfires and climate change.

User: Ok

Please answer the following:

1. **Clarity and Understandability**: Is the WildfireGPT’s plan clear and easy to understand for someone with the *user's background*?

2. **Efficiency:** Does this plan change how you would interact with WildfireGPT? If so, what do you think the change is? Do you think these changes improve the efficiency of the following discussion?

3. **Engagement and Personalization**: Does the plan feel relevant and helpful? Or does it feel too much like a template?

4**. Implementation and Monitoring Plan**: In the following discussion, how strictly do you think WildfireGPT is sticking with the plan? Is WildfireGPT communicative about what step in the plan it will take to you? Would you appreciate if WildfireGPT follows the plan more or less?

5. **Additional Comments**:

Memory + Toolbox Module  
  
Assistant: Great! To get started, could you provide me with specific details about the location in Las Vegas, NM that you are concerned about? Additionally, is there any particular aspect of the impact of wildfires and climate change on urban development and housing that you would like to prioritize for our discussion?

User: The area of interest is the area between Las Vegas and Montezuma

Limitation:

During the meeting, we mentioned that this second question feels repetitive.

Assistant: Understood. To proceed, I will interpret relevant data and analyze the fire risk in the area between Las Vegas and Montezuma. This will include considering the long-term fire history records, recent fire incident data, and the Fire Weather Index (FWI) to assess the potential impact of wildfires and climate change on urban development and housing in this specific area.

I will start by gathering the necessary data to carry out this analysis. Do I have your permission to proceed with collecting and interpreting the data for the specified location? Additionally, if you have any further details or questions at this stage, feel free to share them.

User: Sure  
  
Assistant: It seems that I couldn’t retrieve specific fire history records for the area between Las Vegas and Montezuma. However, I will continue by analyzing the Fire Weather Index (FWI) and recent fire incident data to assess the wildfire risk in the specified location.

Now, I will proceed to gather and interpret the FWI and recent fire incident data for the area to provide you with a comprehensive understanding of the wildfire risk. Do I have your permission to proceed with this step? Also, if you have any further questions or specific aspects you would like to focus on, please let me know.

User: Sure

Limitation:

During the meeting, the OpenAI API failed when calling tools.

Assistant: It seems that I couldn’t retrieve specific fire history records for the area between Las Vegas and Montezuma. However, I will proceed to gather and interpret the Fire Weather Index (FWI) and recent fire incident data for the area to assess the wildfire risk.

I will make sure to gather data from alternative sources to provide you with a complete understanding of the wildfire risk in this location. Thank you for your understanding. I will notify you once I have gathered and interpreted the relevant information. If you have any other questions or details to share in the meantime, please feel free to do so.

User: Ok  
  
Assistant: The Fire Weather Index (FWI) provides key insights into the future fire risks in the specified area between Las Vegas and Montezuma. The historical FWI values indicate that the risk of wildfires has been notable in the region, especially during the summer and autumn seasons. As per the historical data, the FWI shows an increasing trend from spring to summer and autumn, indicating a higher potential for fire danger during these seasons. The winter season’s FWI values are relatively lower, which suggests a lower risk of fire during that time.

Moving to the projections, the mid-century (2045 - 2054) FWI values indicate a further increase compared to historical values, particularly in spring and summer, signifying an elevated fire risk during these seasons in the future. The end-of-century (2085 - 2094) projections exhibit even higher FWI values across all seasons, indicating a substantial escalation in fire danger as we approach the end of the century, especially during spring and summer.

These trends reveal an increasing risk of wildfires in the area between Las Vegas and Montezuma, particularly during the spring and summer seasons. It’s important to note that the FWI values are relatively high, especially during the projected periods, signifying a significant potential for fire danger in the future.

The higher FWI values for this area indicate an elevated risk of fire, and it is crucial to consider these projections when planning for urban development and housing in the wildland-urban interface. It is imperative to incorporate robust wildfire risk management strategies and measures to mitigate the potential impact of wildfires on housing and urban development plans in this area, taking into account the projected increase in fire risk.

The FWI data was retrieved from the Climate Risk & Resilience Portal (ClimRR), developed by the Center for Climate Resilience and Decision Science (CCRDS) at Argonne National Laboratory. You can access the website at: https://disgeoportal.egs.anl.gov/ClimRR/

Do you have any questions regarding the interpretation of the FWI data for this area, or is there anything else you would like to discuss before we proceed?

A screenshot of a computer screen

Description automatically generated

Please answer the following:

1. **Clarity and Understandability**: Are the interpretations of the data clear and easy to understand for someone with the *user's background*?

2. **Efficiency:** WildfireGPT talks about the trend of the wildfire risks. What other interpretations would you like to see to make the data interpretation more intuitive and effective?

For example, would you like to see WildfireGPT explain whether the risk is high or low? If so, which standard would you like to see WildfireGPT to compare that against? E.g. at a local level (say within New Mexico) or the national level?

3. **Data and Backend**. We mentioned that uncertainty quantification would be helpful. Tanwi also mentioned in earlier meetings that a direct link to a report generated by climRR will also be helpful. What else would you like to see?

4. **Engagement and Recommendation**: WildfireGPT stops after emphasizing that it is important to take these projections into account, but does not start offering recommendations yet. Is that a good/bad/neutral to you? Would you prefer the recommendations to come earlier?

5. **Additional Comments**:

User: It seems like there is higher risk in the spring at the end of century even though historically it is riskier in the fall?  
  
Assistant: That’s an astute observation. While historically the fall season has shown a higher risk of wildfires in the area, the FWI projections indicate a potential shift in the seasonal fire risk. The end-of-century projections suggest an increase in fire danger during the spring season, surpassing the historical fall season risk.

This shift in the seasonal fire risk emphasizes the importance of considering the evolving patterns of fire danger as a result of climate change. It’s crucial to adapt risk management and mitigation strategies to account for these changing patterns, especially when planning for urban development and housing in wildfire-prone areas.

Given this, it’s important to explore specific and targeted risk management and housing development strategies that can accommodate these projected changes in seasonal fire risk.

Before we proceed, do you have any further questions about the FWI data or would you like to explore any other aspects related to wildfires and climate change in this area between Las Vegas and Montezuma?

User: Do you have potential explanation for this?  
  
Assistant: The potential shift in the seasonal fire risk, with the spring season showing higher future fire danger compared to the historical fall season, could be attributed to several factors influenced by climate change. These factors may include changes in temperature, precipitation patterns, fuel availability, and ecosystem dynamics.

For example, with climate change, temperatures are projected to rise, leading to an earlier onset of warmer and drier conditions in the spring. Warmer spring temperatures may result in earlier snowmelt, dry vegetation, and an extended fire season. These changes can significantly impact the availability of fuels, increasing the susceptibility of the landscape to fires during the spring.

Moreover, alterations in precipitation patterns can affect the moisture content of vegetation, affecting the fuel availability and fire risk. Changes in precipitation may lead to a drier spring season, further exacerbating fire danger.

Ecosystem dynamics, including the composition and structure of vegetation, can also contribute to the shift in seasonal fire risk. As vegetation responds to changing climate conditions, the distribution and abundance of different vegetation types may shift, influencing the overall fuel characteristics and fire behavior during different seasons.

Understanding these potential explanations and considering the specific local conditions and dynamics in the area between Las Vegas and Montezuma is crucial for developing targeted wildfire risk management strategies and housing development plans.

Given these potential explanations, it’s important to further explore the specific local conditions and factors that may be contributing to the projected shift in seasonal fire risk. Is there any additional information or specific research focus that you would like to explore regarding the potential explanations for the projected shift in seasonal fire risk in this area?

Please answer the following:

1. **Clarity and Understandability**: Are the explanations of the data clear and easy to understand for someone with the *user's background as a risk manager*?

2. **Factuality:** We didn’t have too much time to check this during the meeting. On second thoughts, do these explanations make sense? Does WildfireGPT sound overly confident?

3. **Engagement**: Does WildfireGPT feel like a trustworthy companion for discussions like this? Would it be helpful to educate the user to be critical/skeptical of the responses?

4. **Additional Comments**:

User: You said change in snowmelt, dry vegetation, and an extended fire season can significantly impact the availability of fuels, increasing the susceptibility of the landscape to fires during the spring. Is this backed by scientific research?  
  
Assistant: Here are the key findings from the papers that are relevant to the user’s concern regarding the impact of climate change on fire season and fuel availability in the Southwestern United States:

**1. Margolis, E., Woodhouse, C., & Swetnam, T. (2017)**: This study focused on the relationship between climate variability, moisture conditions, and fire occurrence in the Jemez Mountains, New Mexico. The results indicated that large fires burning in all seasons are influenced by the current year cool-season moisture, but fires burning mid-summer to fall are also influenced by monsoon moisture. Persistent cool-season drought longer than 3 years may inhibit fires due to the lack of moisture to replenish surface fuels, suggesting that fuels may become increasingly limiting for fire occurrence in semi-arid regions that are projected to become drier with climate change.

**2. Scasta, J., Weir, J., & Stambaugh, M. (2016)**: This research emphasized that fire activity fluctuates with short- and long-term weather and climate trends. Historical evidence demonstrated that generally, fire was most frequent during warm-dry periods as opposed to cool-moist periods. However, the authors noted that arid regions may see an increase of fire activity with an increase in moisture due to inherent fuel load limitations.

**3. Gutzler, D., & Alst, L. (2010)**: The study highlighted the relationship between springtime wildfires and the onset of the North American monsoon, usually around the beginning of July. It suggested that wildfires in late spring could potentially affect the onset of the monsoon and subsequent precipitation, impacting the overall fire regime. This assessment provided insights into the potential interplay between wildfire dynamics, climate variability, and the regional precipitation patterns.

These studies collectively shed light on the complex relationships between climate variability, fuel availability, and fire occurrence in the Southwestern United States, which directly aligns with the user’s concern about potential explanations for the projected shift in seasonal fire risk. The findings underscore the importance of considering climate projections and landscape dynamics when evaluating future fire risks and planning for effective wildfire management strategies.

References: Margolis, E., Woodhouse, C., & Swetnam, T. (2017). Drought, multi-seasonal climate, and wildfire in northern New Mexico. DOI: https://doi.org/10.1007/s10584-017-1958-4 Scasta, J., Weir, J., & Stambaugh, M. (2016). Droughts and Wildfires in Western U.S. Rangelands. DOI: https://doi.org/10.1016/j.rala.2016.06.003 Gutzler, D., & Alst, L. (2010). Interannual variability of wildfires and summer precipitation in the Southwest. DOI: 10.58799/nmg-v32n1.22

Please answer the following:

1. **Clarity and Understandability**: Is the presentation of research clear and easy to understand for someone with the *user's background as a risk manager*? Is this too technical?

2. **Factuality and Relevance:** During the meeting, Ross mentioned that the first paper is very relevant, both in terms of the technical topic and the spatial proximity. How can wildfireGPT do better?

3. **Engagement**: It seems like the paper that WildfireGPT finds does not snowmelt and extended fire season. Would you like WildfireGPT to present a more complete set of research? Or the possibility to having too much information could be overwhelming?

4. **Additional Comments**:

User: We are interested in what the average home owners can protect themselves in the event of wildfire and water supply shortages. In light of this discussion, what would you recommend?  
  
Assistant: These papers are highly informative and relevant to your concern about wildfire risk management strategies for homeowners in fire-prone areas with water supply shortages.

1. **“Wildfire risk and home purchase decisions”** by Patricia Champ, Geoffrey Donovan, and Christopher Barth (2008) explores how homebuyers consider wildfire risk when purchasing homes in fire-prone areas. The findings emphasize the need to understand the influences on homeowners’ decisions and factors that could enhance wildfire risk mitigation and preparedness in residential areas.
2. **“Managing Wildfire Risks: Effects on Water Resources With and Without Fuel Treatment”** by Jay O’Laughlin and Alan Ager (2007) discusses the complex challenges that wildfires pose to water resources. The paper delves into risk assessment techniques, landscape characteristics, and strategic fuel treatment placement to reduce wildfire extent and associated risks to valuable resources, shedding light on potential strategies for mitigating the impacts of wildfires on water resources.
3. **“Wildfire and the future of water supply”** by Kevin Bladon et al. (2014) provides insights into the potential effects of wildfires on water quantity and quality. The paper highlights the rising concerns about the implications of wildfires for downstream water uses, particularly safe drinking water, and emphasizes the need for a better understanding of the effects of wildfires on water to develop effective adaptation and mitigation strategies.

These papers collectively address the complex interplay between wildfires, residential decisions, water resources, and the need for effective risk management strategies in fire-prone areas with water supply shortages.

References: Champ, P., Donovan, G., & Barth, C. (2008). Wildfire risk and home purchase decisions. O’Laughlin, J., & Ager, A. (2007). Managing Wildfire Risks: Effects on Water Resources With and Without Fuel Treatment. Bladon, K., et al. (2014). Wildfire and the future of water supply.

User: What do these mean to an average homeowner?  
  
Assistant: The findings from these research papers provide valuable insights for average homeowners in fire-prone areas with water supply shortages. Here are some recommended strategies:

1. **Mitigating Wildfire Risks for Homes**: Based on the research by Patricia Champ, Geoffrey Donovan, and Christopher Barth, homeowners should consider proactive measures to protect their homes against wildfire risks. This includes creating defensible space around the property, utilizing fire-resistant building materials, and maintaining the landscape to reduce the risk of fire spreading to homes.
2. **Water Supply and Fire Preparedness**: Given the potential impacts of wildfires on water resources, homeowners should ensure they have a viable water supply for fire preparedness and firefighting. This may involve storing an emergency water supply, maintaining functional irrigation systems for defensible space, and working with local fire authorities to understand the water requirements for fire suppression.
3. **Community Engagement and Planning**: Homeowners should engage with their local communities and fire departments to develop and participate in fire prevention and preparedness programs. Collaborative efforts can include neighborhood fire safety assessments, community wildfire protection plans, and shared strategies for water conservation and fire response.
4. **Risk-Informed Property Decisions**: When purchasing homes in fire-prone areas, homeowners should consider the wildfire risk and potential impacts on water resources. Proactive assessment of wildfire risks and water availability can inform informed property decisions and preparation for potential scenarios related to water supply shortages during wildfires.

These recommendations are derived from the research findings and aim to empower homeowners in fire-prone areas with the knowledge and strategies to protect their homes and address potential water supply shortages in the event of wildfires.

Is there a specific area or location where you would like to implement these recommendations, or do you have any other questions or considerations related to wildfire protection and water supply shortages for homeowners?

Please answer the following:

1. **Clarity and Understandability**: Are the recommendations clear and easy to understand for someone with the *user's background as a risk manager*? Is this too technical?

2. **Factuality and Relevance:** Interestingly, the first recommendation is based on the first paper cited in the previous discussion. During the meeting, we also mentioned that the second paper seems not as relevant to an average home owner. (@Tanwi and @John, this turns out, to partly be the fault of the search algorithm we had. WildfireGPT asks the research database to search:

“Wildfire risk management strategies for homeowners in fire-prone areas with water supply shortages.”

When the second paper was returned to WildfireGPT as context for RAG procedure, WildfireGPT chose not to ignore it).

Which recommendations/research feels more relevant? How do you think we can improve this if this is an actual wildfire consultant?

3. **Engagement**: Would you prefer the response to be more interactive? Or this listing of recommendations feels better for you? Does it feel like an information overload? How do you think an actual wildfire consultant would organize the information?

4. **Additional Comments**:

Overall:

1. **Resourcefulness and Guidance**: How well does the assistant guide the user towards addressing their concerns? This involves considering whether the assistant provides actionable advice, useful questions, or suggests resources that could help the user in their risk management planning related to wildfires and climate change.

2. **Compare with an actual wildfire consultant**: Which part of WildfireGPT feels like talking to a trusted consultant? What’s missing? How would you provide the feedback for this interaction if WildfireGPT is an actual consultant?

3. **Value Addition**: Assess whether the consultant has added value beyond the immediate problem. This can include transferring knowledge to the client's team, identifying additional areas for improvement, or providing insights that the client hadn’t considered.