Notes for the AI workshop organised by

ERA-Shuttle project

"Scientists Need More! Next Level Productivity Using AI Assistants"

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Workshop modules:

Module 1: **what are GPTs** and how do you use GPT-based tools with **good prompting**?

Module 2: AI Assistants for **scientific writing and for scientific literature review**

Module 3: AI-based **brainstorming**

Module 4: **Introspection** with AI assistants**, decision making** and preparing for your next **job interview**.

Module 5: From Zero to **Coding with AI Assistants**.

Module 1: what are GPTs and how do you use GPT-based tools with good prompting?

How to use just two tools to increase your productivity: Use Chat GPT only for production, not for source information. For source information you use the second tool, either perplexity.ai or [Bing chat.](#) ChatGPT cannot provide sourced information (yet) - it hallucinates.

Because Chat GPT is hallucinating, it's not recommended to use it for getting information. Use it for production, while Perplexity is for information, for sourcing the information. Chat GPT 4.0 (pay version) has plugins, and their functionality is linked to the internet - use them to increase your productivity.

Perplexity works differently from Bing; Bing chat is probably going to be better over the long term because it's using the resources from Microsoft's Opening AI.

Perplexity is being funded by people by investors who want to replace Google. This replacement is already happening. Google is giving you 10,000 answers, and that's 9,900, 99 more than we need. But we just need one answer.

What Perplexity does is it's giving you an answer by linking you to websites that you immediately can look at and see what's the source. Perplexity can also provide you with the answer at different levels: there's a standard research tool and there is a co-pilot which can help you to ask more complicated questions.

If you would like to have a tool for producing images, what do you do? You want to make music with AI? To search for a particular AI tool, go to a website called "There is an AI for that". You don't need to keep track of things anymore, because it's updated regularly.

To search for a particular AI tool you can also use Perplexity as an entry point with the following type of prompt: "I want to produce music - give me five AI tools and list the advantages and disadvantages of them. And they should be for free and I want to understand them in 5 minutes".

More info on the [shared Google folder](#).

That was the first level, two tools. Next level is how to prompt them.

How do you use these large language models? You treat them as if they would be team workers, the new colleague, who doesn't really understand what you want. Therefore, you have to tell them exactly what you want – a few times and every time say it in a different way.

If you throw something at the large language model, it's going to throw something back. It's called the shotgun approach. If you want something specific, you need to be like a sniper, with a long barrel to hit the target. You need to be more specific. So, what you do is you produce a framework. You put a frame around what exactly you want. The frame has to describe what's inside, as well as what's outside. You can also specify "I don't want this, and I don't want that".

What does the framework actually mean? It means you set constraints; you can be ultra-specific on what you want. The more specific you are, the higher the chances that the product will be exactly what you want. The longer the prompt, the better you hit the target.

ChatGPT can be verbally prompted using the microphone. If the prompt is long, it's much easier to explain what we need verbally and it will turn speech to text. Give as much context as possible. Example of the prompt for the text with structure:

"Please produce an elaborate outline for a press release following this structure:

Headline: A summary that sparks interest.
Introduction: The presentation of key information.
Body: Detailed information including supporting elements.
Boilerplate: A brief about the company or organization.
Contact Information: Details for further inquiries."

You can give **custom instructions** for ChatGPT ([FAQ about Custom Instructions for ChatGPT](#)) to explain to ChatGPT who you are and what mind set you would like to use.

Nils Liedlich has a word document with 500 words that describe who he is, which he just refers to whenever he wants something about to do for him. Keep in mind that AI companies want to get as close to us as possible. That's the trade that you do, the better the product that you want, the closer you have to allow them to yourself - that's your choice.

How do you make the machine follow the format? You give it an example! Prompt: "Here is what I want this to look like".

For more information on how to write great prompts - https://podcasters.spotify.com/pod/show/theimperfectscientist

Storage of your data: You can specify for CharGPT that you don't want your data stored for the future generations and in the database for their training.

There is a button on ChatGPT you can actually switch off to make sure your input is not being used for training.

The update is monthly, so it's possible that next month, your competitors enter the same question. They get your ideas. That's a drastic example, but we can't exclude this because our input can be used for training the model. You can switch this function off, to make sure it's not used for training. You still cannot prevent them from keeping your data, but consider the fact that storage is expensive. Storing data actually costs money. So they can take the data and they can store it - there's no way to exclude this. But you always have to ask yourself - what is going to happen if the company goes bankrupt. They can say all they want, but if they go bankrupt, they go to sell their assets. And data is an asset. Your data is going to be with them, whatever you upload.

What **ChatGPT** is good at is remembering things. **Perplexity** is actually really bad at remembering your previous input because they use the lowest the cheapest model. It only remembers 8,000 tokens, ten abstracts.

Module 2: AI Assistants for scientific writing and for scientific literature review

Building on the knowledge of large language models, this module provided a glimpse into practical applications, demonstrating how scientists can use AI tools for text production and analysis. The following points were discussed during this module:

1. Practical uses of large language models in life sciences.

2. Best practices for texting with AI models.

3. Techniques for effective text analysis.

4. Mastering the art of prompting for better outcomes.

Here are the examples of advanced prompting techniques, which are critical for obtaining desired outputs - in this case it is a **prompt** for **ChatGPT for the writing of the letter to the editor of scientific magazine**.

- I would like you to write a letter to the editor. I am a leukemia researcher, and I would like the editor to see the manuscript for review. The interest of the editor is to identify papers that are very influential in the scientific community and benefit society as a whole. I will give you the abstract of a manuscript. And from this abstract, I would like you to draft the letter to the editor, try to be as specific as necessary in describing the findings of our research, but then focus on how the scientific community and society is going to benefit from this work. Please don't use too flashy language. Please try to be concise and to the point so that the letter is no longer than 1.5 pages. I will now give you the abstract of our manuscript.

After using such a prompt your letter is about 80 % ready. You would still have to tailor it a bit more. But having 80 % of the work done for you, you can focus on the 20%. The last 20 % of fine tuning - that's where you can still apply your expert knowledge.

If you have never written a letter to the editor before, you can now do this within 5 minutes.

How do we know that **ChatGPT** is not hallucinated in this letter, putting in something that's not in the manuscript? This is exactly why you use **ChatGPT** for things that you're good at, or where you can judge whether the product is good. Do what you normally do and know how to do this - **ChatGPT** is there to help you to do it faster.

If you've never done this before, your first press release is going to be much better when you produce it using AI **- ChatGPT** is going to increase the quality of my output by at least 40 %. . If you have written press releases before, you can just ask for the first hook up line and for the final punch sentence - that is how your output might become better.

For more information and training in scientific writing check out [asynchronous learning platform](#).

How to formulate the context of the press release: Remember **why** you are writing this press release, **who's** the audience? **What's** your intention? **Where** should this go? **What's** the effect you want to have? Because that's the stuff that is still requiring our input. It's really important to include the above info when you are telling the AI bot what you need.

If you have zero knowledge about writing a press release, you can actually go one step before that and ask AI "What questions should I be asking you?". You can start off by telling ChatGPT "You're going to help me ask you the right questions. What is important to put into the press release? Help me. It's the first time I am writing this, what should I put into the press release? Which tool do you use? What are elements that are good to be in a press release?".

You can improve the outcome by providing ChatGPT with some **examples.** You can upload your ideal example of press release and advice ChatGPT "This is how I want this to look".

Languages and translation: Bard is better when it comes to real languages because it's connected to the internet - similar to **Perplexity**.

If you want press releases to be translated into other languages: **ChatGPT can do translations**, but there's one tool that's better. This is called **DeepL** , it actually follows data protection guidelines from the European Union, because it's based in Germany.

Which tool is best for helping with literature review? With **ChatGPT** your literature review is going to become better, because now you can ask a question and refer to 20 papers at the same time.

You can make things that are hard to understand (for example, research papers on AI) understandable by asking AI "What does this mean? Explain it to a 5-year-old". You can have the bot open on the side all the time to brainstorm ideas for experiments, how to identify collaborators, how to talk to the collaborator, how to onboard the collaborator.

For more ideas check the podcast **[The AI tools we use for our research](#)**

Module 2 was wrapped up with the interactive session dedicated to the hands-on prompting exercise with AI models, using the **prompt for boosting the creativity:**

Awareness prompt can help you with things you want to explore, with finding new and alternative pathways; Awareness prompt will encourage AI to use associations, a wide range of ideas and concepts, out of the box thinking, challenge norms.

It helps you to define what is what's inside the frame, to specify what you want. What's outside the frame: don't repeat or summarise, do not go off trucks, no long blah, blah, blah, do not make assumptions about any requests. This prompt you can use for boosting your creativity.

Resources: Awareness mode prompt - ▮ Awareness mode prompt.pdf

Specialized GPT bots: „GPT for Good Scientific Practice" (https://chat.openai.com/g/g-pxbX1k0gc-gpt4gsp) and „The imPerfect Scientist GPT" https://cryosphere.tech/index.php/imperfect-scientists/

Module 3: AI-based brainstorming

AI can be used for comprehensive brainstorming and can provide structure, helping researchers develop innovative ideas and frameworks. This module covered AI's role in idea generation and organization, showcasing how it can inspire creativity and promote logical thinking in scientific research.

The discussion was organised around the following points:
1. Introduction to AI-aided brainstorming.
2. AI tools for idea generation and mind-mapping.
3. How AI can help structure and organize thoughts.
4. Techniques for extracting value from AI-generated content.

When we use emotionalized wording, the output produced by the AI is going to be better. If you say "ChatGPT please take a deep breath, think deeply, and then give me the output! Please do this, it's so important for my career" - the output is going to be better.

The output is going to be better if you **emotionalize the language of your prompt input**. Why is the product better in this case? We don't know, because it has 1 trillion parameters. What OpenAI is currently doing is giving ChatGPT all Hollywood movies to watch, because then emotionalization is going to become even better.

The more you treat AI like a human, the better the output is going to be. It was unexpected. AI was trained on the content of the internet, and there are all kinds of emotions on the internet. Maybe that's why it's working better.

Every hundred datasets you give it, it's going to increase in robustness by 10 %.

On the concepts of **aligning AI with human ethics**: this is to have another AI control AI. That's the current solution, which is not a solution because it's a closed circuit.

Explore more on the challenges and solutions in aligning AI with human values and ethics:
https://80000hours.org/problem-profiles/artificial-intelligence/

Module 3 was wrapped-up with a hands-on session, where the participants engaged with AI for brainstorming and idea organization.

Module 4: Introspection with AI assistants, decision making and preparing for your next job interview.

The utility of AI now extends beyond just drafting reports, manuscripts, and grants. AI can also streamline and objectify your literature reviews, making them faster, more efficient, and less biassed. You can use it to amplify your research outreach and visibility on social media. But perhaps the most profound application is in assisting your brainstorming and soft skills: generating innovative ideas for experiments, experimental controls, project strategies, and formulating pivotal research questions. Or for support with difficult decisions, problematic conflict situations and tough negotiations. And if you want, you can use AI to train, self-optimize and also introspect.

With reference to Zaikan (one of the AI influences), who has several prompts for decision making (What are the pros and cons?), here are **prompts for the second order effects** (brainstorming to see what's going to happen & what might happen)**:**
  - Study my decision and generate the list of second order effects.
  - What could happen due to this decision? If I do this what's going to happen afterwards and what's the follow-up if I do that?
  - What will happen, what might happen as second order effects.

Prompts for decision making & optimisation

Prompts for regret minimization: AI bots are excellent for bigger picture perspectives. They can help you to generate a list of possible regrets your decision could bring about.
  - What am I going to regret if I do this?
  - What am I going to regret if I do that?
  - Give me a list of alternate decisions that would reduce regret.
  - Give me the most simple and uncomplicated explanation of why this is a good or bad decision.
  - 18/20 method: use the 80/20 method to identify the 20% of factors I should pay attention to.
  - Get feedback on your decision from history's greatest minds. Assume you are that infamous person (for example Steve Jobs or Barack Obama), here is the problem, look what I'm going to do here and tell me what decision should I take.

You can use then Barack Obama's voice to voice the output: For your long-term development you should be thinking about the following: …. ; for the benefits of Society, it would be really good if you would be doing this and this;

Prompts for the interviewing (Career Counselling coach): GPT can simulate an interview - it has about 10 topics to discuss your technical skills, soft skills and career aspirations.
Sometimes it's important to use prompt "Please tell me the answers one after the other".
Go to the survey after you did the interviewing and give the feedback.
Use ChatGPT bot that was specifically designed for ERA-Shuttle project-
"Sci-Talent-Interviewer" to introspect for your career
(https://chat.openai.com/g/g-pGlTZ14e7-sci-talent-interviewer)
For the feedback on how effective and helpful the bot was - please go to feedback page here -
https://schillermertens.typeform.com/to/KKqi4gyP

Prompts for negotiation:
Helps to design the arguments from one side, what could be arguments from the other side, where are areas of compromise.
Describe both persons. Remember that the real negotiation involves listening.

How do you optimize the bot?
There are several options: one is to tell the bot everything upfront (write a very long prompt).
The other option is to educate the bot by chatting with it.
List of recommended ChatGPT plugins:

For more information on the Effects of AI on Knowledge Worker Productivity and Quality -
📄 Full paper dellaqua AI increases speed and quality and equalizes differences in performanc…

The list of the list of plugins recommended for the academics and Research Managers:

MixerBox WebSearchG: Ideal for conducting quick web searches, this plugin allows users to browse search engine results within the chat interface. It's useful for preliminary research, fact-checking, and staying updated with the latest developments in a field.

PDF Extractor: This plugin is invaluable for researchers dealing with numerous PDFs. It can extract and summarize content from PDF documents, making it easier to sift through academic papers and reports.
ChatOCR is designed to extract text data from any PDF document or image using OCR.
StackOverflow Plus - Expand your knowledge beyond 2021/09/01. Get recent questions and answers from Stack Overflow.
Link Analyzer is a versatile ChatGPT plugin that offers a range of functionalities to analyze and evaluate web links.
Lucid ChatGPT plugin allows you to visualize just about anything, including complex systems and relationships

Also refer to the **"MixerBox FindGPT"** to discover the GPTs that might be useful (instead of plugins).

Module 5: From Zero to Coding with AI Assistants.

This module is designed **to empower scientists with no programming background** to use AI tools effectively. It will use AI-tools to take you from nothing to a running implementation. The major challenge is changing the mindset towards "everything is possible".

Example: Produce the excel table, fill it with random numbers and produce the heatmap.
1. Ask Chat GPT to produce an Excel file, filled with random numbers between 1 and 10. Distribute it on a 100/100 matrix table.
2. The code from this matrix has to produce a heatmap with the shades of yellow and blue. Use Piton elements that are the newest.
3. In that code provide a description of what the elements are doing.
Chat GPT opens the black screen window with the Piton code, which we can copy and paste. Then ask Perplexity how to implement the code:
- How do I implement the code that I produce using GPT?
- Please consider that I am a total beginner in coding, so please use language for a beginner that explains step by step what I am supposed to be doing.
- Also please give me links to resources that you mentioned that I need.
- Do I need to install Python, how do I do this, please give a step by step protocol for a complete beginner.

After the code is ready, copy and paste it into Notepad and save it as a file.
After Piton is installed, open the folder with the saved file, copy the path (address) and copy-paste it into Piton - this should produce the heatmap.

For more info on coding using AI - sign up to the emailing list for regular updates and insights:
https://mailchi.mp/2fe797da2fc4/coding-with-ai-tools
and see Linkedin post on this subject
https://www.linkedin.com/posts/daniel-mertens-05060814_ai-learning-python-activity-70720895
21047097344-hVB4/?utm_source=share&utm_medium=member_desktop

Use AI for image generation: Example: Take 3 images, produce the code to reduce their resolution and fuse them.
- Produce Piton code that asks us for a folder; in that folder our images that we want you to reduce in resolution and then fuse them all together into a new figure.
After that prompt the ChatGPT produces code. Copy and paste it into a Notepad and save it. Give the path to Python.
If Piton gives an error message - go to Perplexity and ask what you should do about this error message.

Copy the message from Perplexity, open Chat GPT and ask GPT to modify the code according to the instructions in the error message.
After this the ChatGPT should produce the desired result - a fused image (and it will place it in the same folder with the original images).

If you want the output of ChatGPT to look nice, use a code for formatting that is called LaTeX. This is a coding language for formatting text.
- please produce this text now in LaTeX, make it look like this format (from example provided - upload a figure or a picture of how you want this to look like).

Example of the prompt for extracting the text from PDF file:
-    produce Python code that extracts all the text from PDF files in a folder; the Piton code should first ask for the folder where all the PDF files are located, then extract all the text from each PDF file and fuse all of the text into a single text file that is placed in that same folder.

Copy the code that ChatGPT produced, put it into this new Notepad file, save as "text_scratcher.py" Open black window of the Python and insert the path to text_scratcher.py.

If Error message received from Python, prompt ChatGPT:
- we got this error message, what do we do. Please modify the Python code accordingly.
ChatGPT should produce the combined text in one file.

Production of pdf with the nicely formatted text: LaTeX also turn your text into a formatted pdf.
-We would like to use LaTeX to produce slides. From now on make all the outputs in Latex ChatGPT will prompt you to copy the code into logic editor compiled document.
Ask Perplexity:
- I have latex code that I want to turn into a PDF online; please list the websites where this is possible for free and easy to use please list the advantages and advantages of the websites.
Go to the suggested Overleaf website and produce a pdf that is nicely formatted.

Good Scientific Practice means you use the best tools available and you are being transparent about it; the journals suggest using the AI assistance to increase the quality of publications. Use the tools to brainstorm the literature review - and then you disclose the fact that AI have helped you with the literature review, same as you would disclose using microscope or a statistical software.

Various ways of Producing slides for presentation:
1. Use Perplexity with the following prompts to produce PPT:
- I have heard there is a programming language for producing slides. What is that and how do I use it?
- Please remember that I am a complete beginner so please explain in plain language.

If the answer from ChatGPT will guide you to use Piton, you might reply as following:

- I would rather like to use PowerPoint instead of Piton; is there also a programming language to do that.
- Use VBA to automatically produce 15 slides on the topic of University of Malta.
- Please access the internet for a relevant introduction and conclusion.
- we want to convince the audience, that consists of academics and admin people to invest more funding into research. Produce VBA code.
- **we don't want to import things manually** please use the internet to produce content yourself that you include in the VBA code

2. Use Chat GPT with plugins for the production of slides (SmartSlides) – you can talk your way to trading slides.
3. If it's just some average presentation that you don't want to spend lots of time on - use some AI tools that produce slides with figures & pictures – can prepare up to 80% of the job for you. For example **Decktopus** allows users to craft captivating presentations without any design experience.
4. Activate the Developer Tool in the PowerPoint.
5. Use CANVAs to produce presentation (60-70% can be done)

Here os the **list of AI Influencers** who were mentioned and referred to during the workshop:
Steve Nouri, Zain Kahn, Ruben Hassid, Mark Fulton, Nils Liedlich

Look out for the following **tools**:
 1. https://www.perplexity.ai/ for finding papers, extracting key claims, summarizing, and brainstorming ideas,
2. https://elicit.org/ and https://www.explainpaper.com for enhanced literature review by providing interactive summaries of key information about those papers in an interactive table and explaining and questioning elements of papers,
3. https://app.litmaps.com/ and https://www.researchrabbit.ai/ for identifying manuscripts connected to your manuscripts of interests with respect to content and/or authors,
4. https://chat.openai.com/chat for brainstorming and texting, - https://www.deepl.com/write for optimizing text,
5. https://openai.com/dall-e-2/ and https://stablediffusionweb.com/ for images