COGNITIVELY-CONSIDERATE DESIGN: REVISING DESIGN KNOWLEDGE TO SUPPORT HEALTHIER INTERACTION PARADIGM

Image created with ChatGPT, 2 prompts

at Workshop: Future Directions in XR and User-Centred Design

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- Calculator for simple arithmetic?
- Repeatedly searching for the same things on Google?
- Relying on birthday reminder?
- Spelling auto-correct as default?

→ Over-reliance on our day-to-day apps?

Most ITs are here to **save our mental efforts**

Usability in HCI says:
Design it simple, intuitive, easy to learn, easy to use, easy to remember…

Photo source: https://tadviser.com/index.php/Project:The_Moscow_subway_buys_cameras_with_a_system_face_recognition_for_1.4_billion_rubles

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Increasing scientific evidences

- **Negative effects** of over-reliance on GPS instruction by taxi drivers [Maguire et al. 2000]
- Having smartphones nearby **reduced users' cognitive capacity** [Ward et al. 2017]
- Ready availability of information online **weakened our memory** for facts [Sparrow et al. 2011]
- **Reduced vigilance** due to auto spell-checker [Galletta et al. 2005]
- Automating cognitive tasks (e.g. problem-solving, decision-making) **hampered our unassisted abilities** in
  - Game playing [van Nimwegen 2008] [van Nimwegen & van Oostendorp 2009] [Burgos & van Nimwegen 2009]
  - Accounting [Dowling et al. 2008]
  - Financial trading [Baxter & Cartlidge 2013]
  - Programming [Haldar 2013]
  - Way-finding [Burnett & Lee 2005] [Fenech et al. 2010]
- **Reduced sense of scale** with prolonged use of CAD [Caicco, 2007]
- Being aware of recording **weakened** people's memory of the experience [Henkel 2013]
- **Reduced brain activity and performance** with ChatGPT [Kosmyna et al. 2025]

⋮

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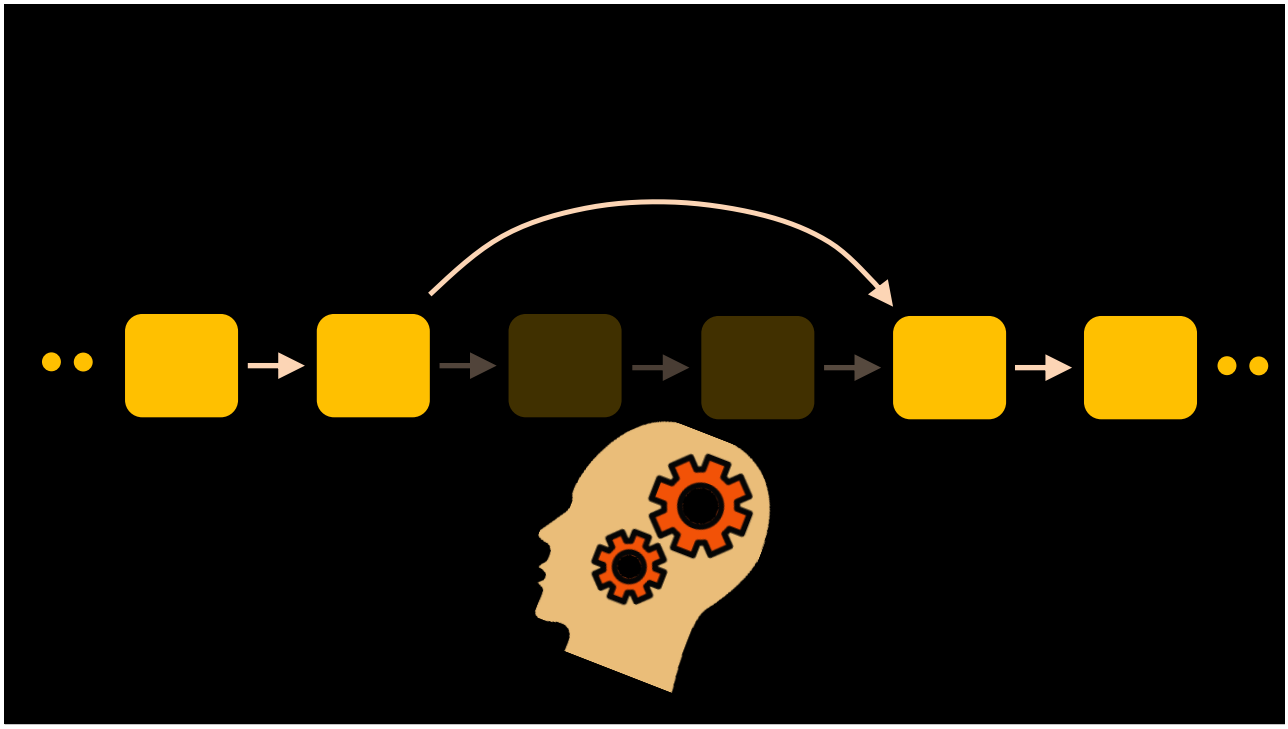

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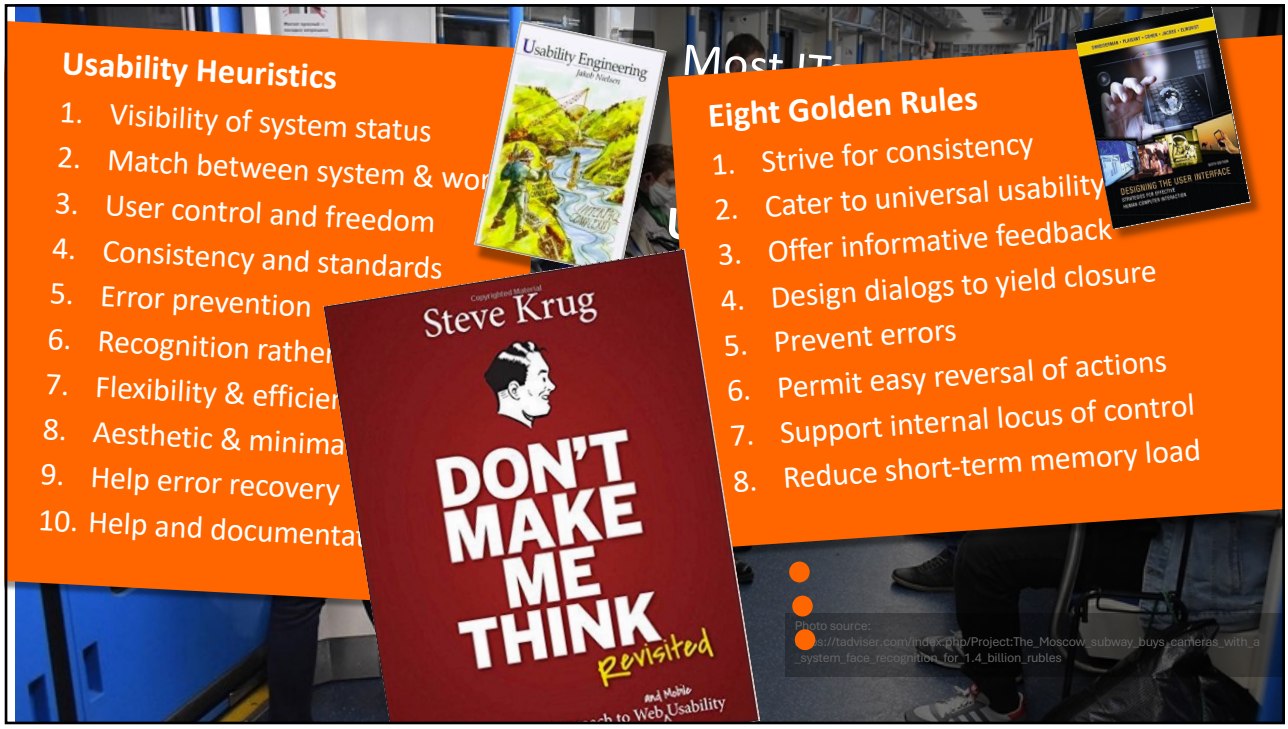
Usability Heuristics
1. Visibility of system status
2. Match between system & wor
3. User control and freedom
4. Consistency and standards
5. Error prevention
6. Recognition rather
7. Flexibility & efficien
8. Aesthetic & minima
9. Help error recovery
10. Help and documenta
Usability Engineering
Jakob Nielsen
Steve Krug
DON'T MAKE ME THINK
Revisited
Eight Golden Rules
1. Strive for consistency
2. Cater to universal usability
3. Offer informative feedback
4. Design dialogs to yield closure
5. Prevent errors
6. Permit easy reversal of actions
7. Support internal locus of control
8. Reduce short-term memory load
DESIGNING THE USER INTERFACE

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Design Principles
• Affordance
• Consistency
• Constraints
• Feedback
• Mapping
• Visibility
Usability Criteria
• Efficiency
• Learnability
• Memorability
• Error rates
• Satisfaction
Eight Golden Rules

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WRITE THE REPORT
GIVE US REPORT TEMPLATE
Created with ChatGPT, 3 prompts

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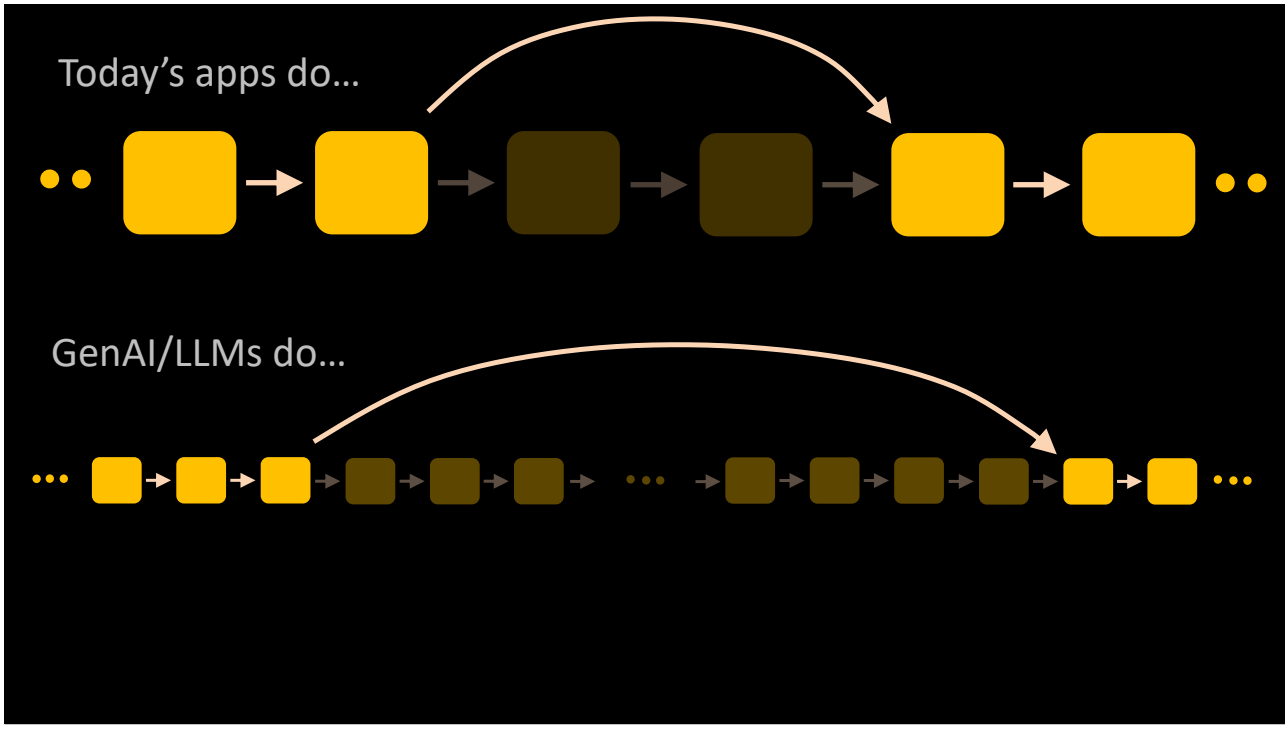
Today's apps do…
GenAI/LLMs do…

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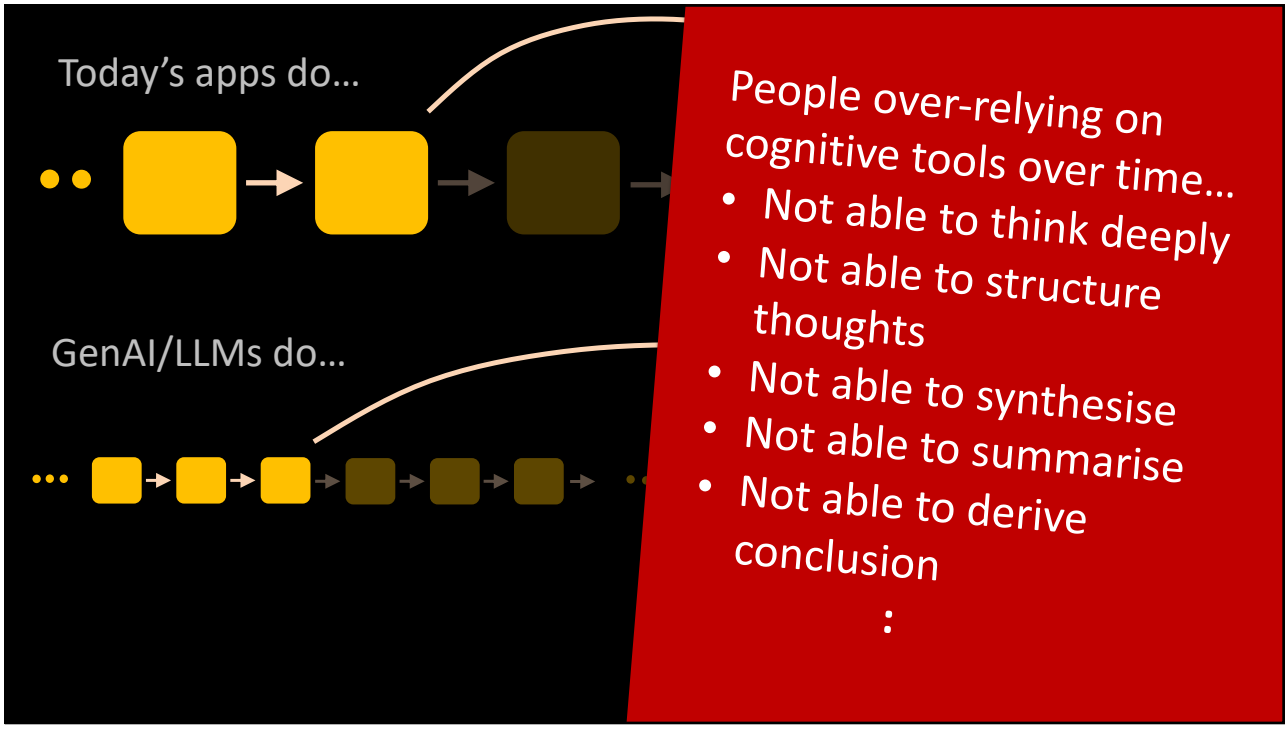
Today's apps do…
GenAI/LLMs do…
People over-relying on cognitive tools over time…
• Not able to think deeply
• Not able to structure thoughts
• Not able to synthesise
• Not able to summarise
• Not able to derive conclusion
:

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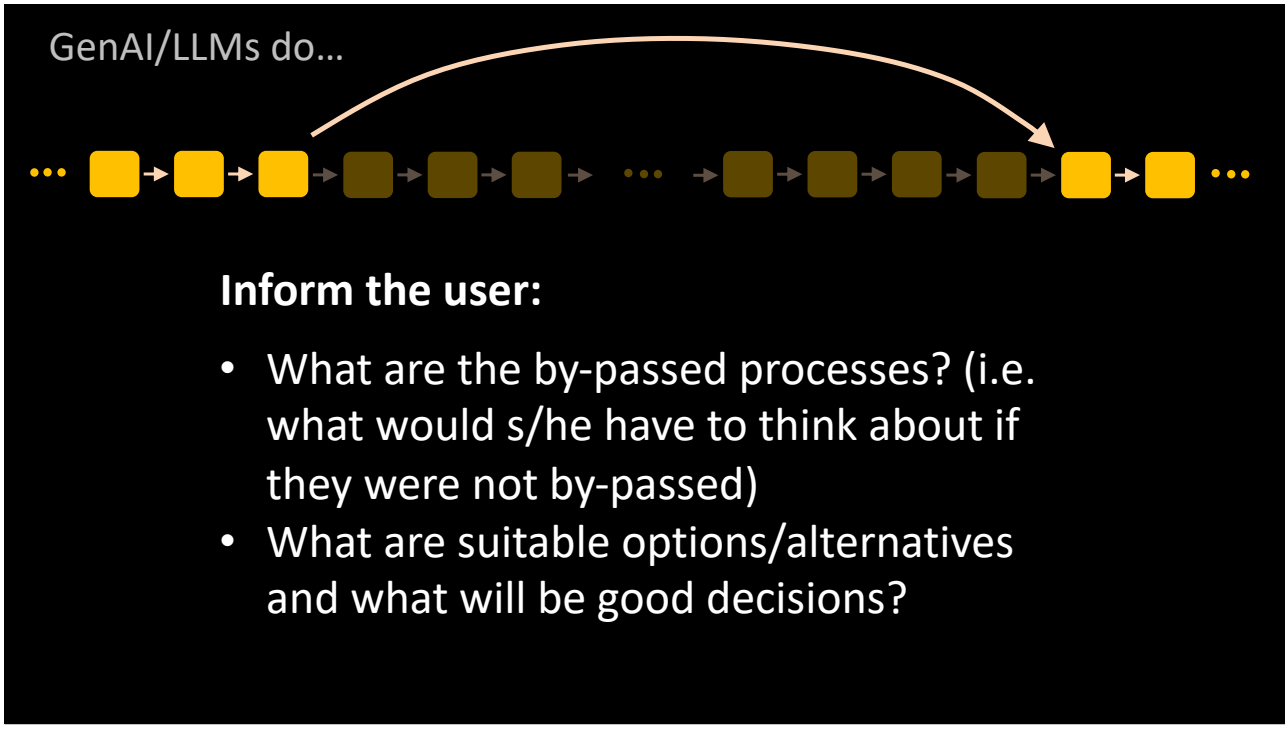
GenAI/LLMs do…
Inform the user:
• What are the by-passed processes? (i.e. what would s/he have to think about if they were not by-passed)
• What are suitable options/alternatives and what will be good decisions?

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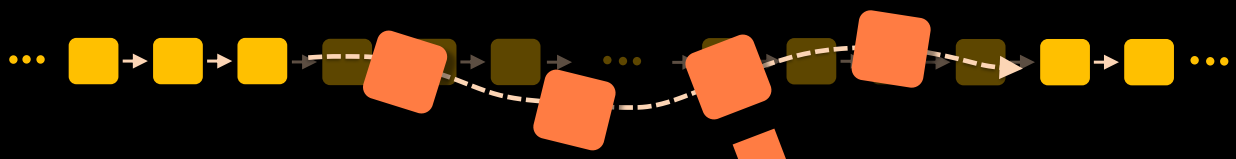
GenAI/LLMs do…



Inform the user:

- What are the by-passed processes? (i.e. what would s/he have to think about if they were not by-passed)
- What are suitable options/alternatives and what will be good decisions?

Bring in iterative steps to let the users see/ choose some crucial factors in the by-passed steps

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CONCLUSION

- ITs undermining our cognitive abilities is **REAL**
- Generative AI/LLMs will likely have many times more effects due to by-passing of cognitive steps
- Design knowledge needs to be re-visited to take this into account
- Many different ways to re-design our current interactions with technology (complicated due to commercial/industry influence)

Thank you

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