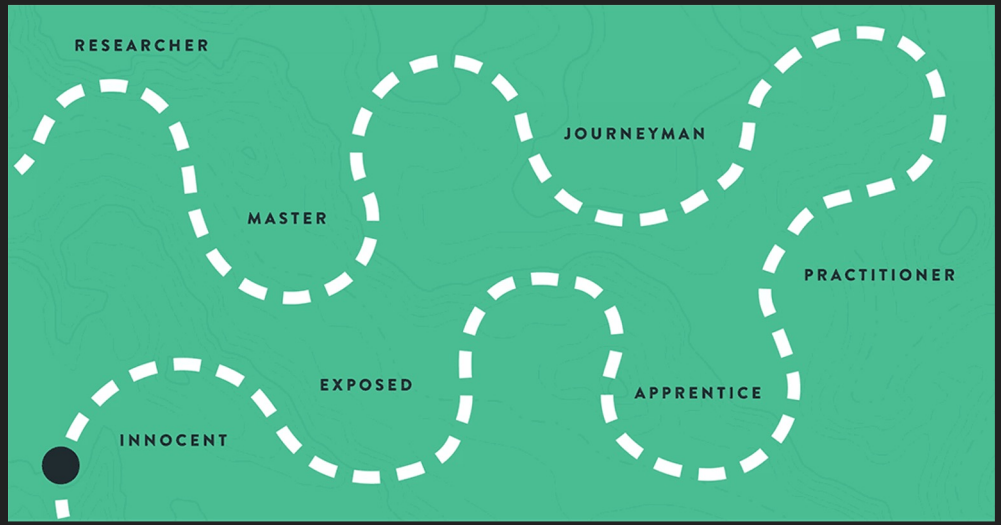
GridLab V.0

A vision for scientific computing & collaboration

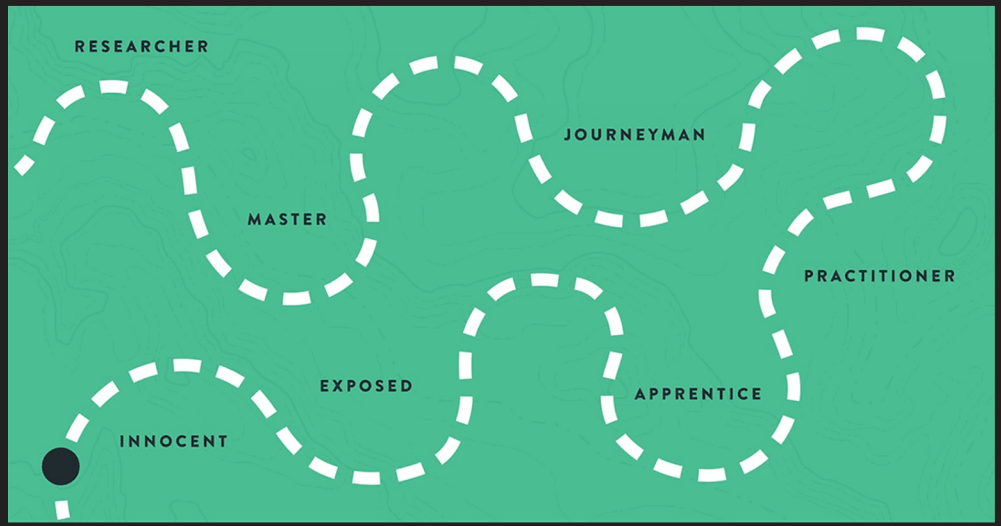
Personal Update



Travels of a journeyman

Personal Update

John Carmack



Travels of a journeyman

Robo-Journalism (Narrative Science 2011- 2014)

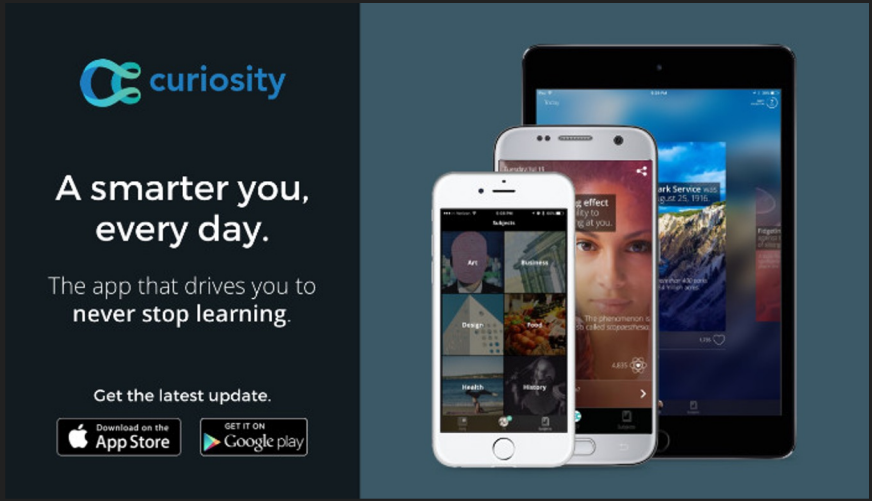
In 2011, Kris Hammond, CTO of Narrative Science, predicted that within 15 years 95% of the world's news would be produced by computers.

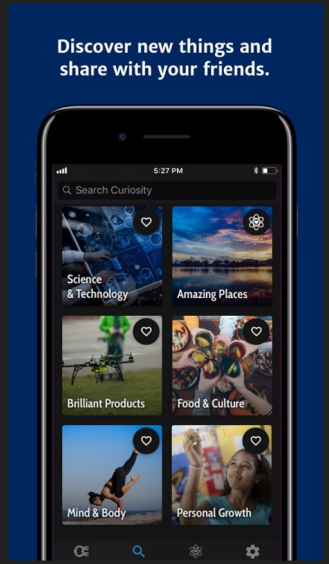
Criticism [edit]

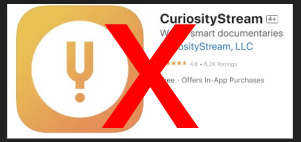
The company received some early criticism from journalists speculating that Narrative Science was attempting to eliminate the jobs of writers, particularly in sports and finance.[17][18][19][20] Critics also argue that biases and assumptions in original data sets can lead to reinforced bias in the stories generated by natural language processors,[21] such as Narrative Science.[21] A CBS article compared artificially generated journalism in the financial sector to the property market bubble, as it leads to "everyone making investments in the same way for the same reasons".[21] The article claimed that computer-generated narratives have the "potential to amplify biases and assumptions, but at far greater speed and on a far wider scale than anything written by humans."[21]

An article from the Columbia Journalism School also criticized the limitations of "robo-journalism" software, as "it can't assess the damage on the ground, can't interview experts, and can't discern the relative newsworthiness of various aspects of the story" and therefore, lacks a necessary human element.[22]

Marketplace For Learning (Curiosity 2014 - 2017)

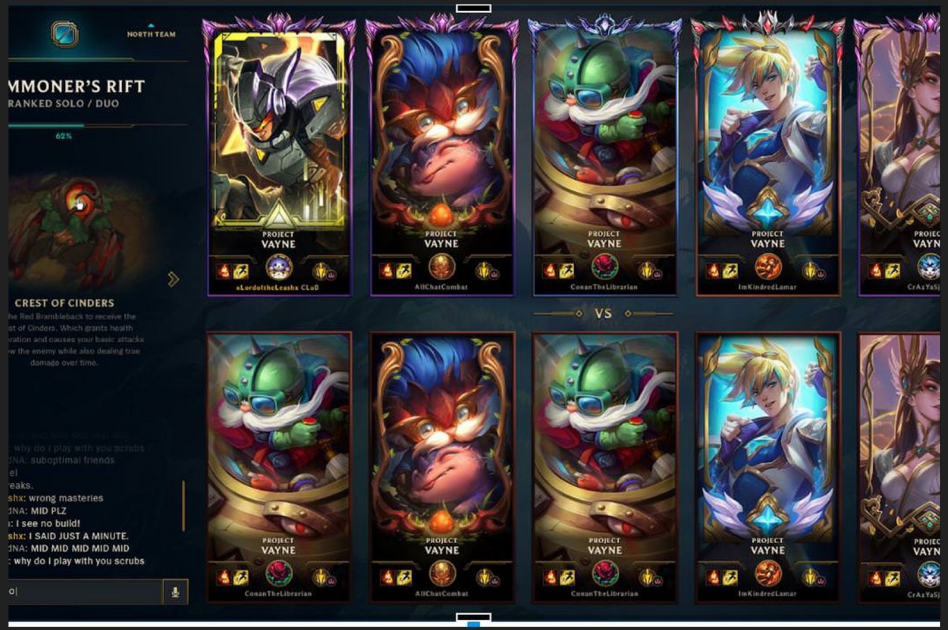






Like “Buzzfeed without brain damage” was a 4.8 star rated app on Android and iOS

League Of Legends (Riot Games 2018 - 2021)



Unreal Fitness (Supernatural @ Meta 2021 - Present)

GridLab V.0.

Virtual laboratories, real life science

Vision Statement

The future of scientific computing and collaboration will consist of:

- **Wearable devices** for interacting in **virtual reality**
- **Smart instruments** that can be controlled remotely
- **Virtual operating environments** composed of **collaborative workspaces**
- **Communities** of **avatars**, both **real** and **artificial**
- Queryable **knowledge agents** and **personal assistants**
- **SDKs** for developing **applications**
- **APIs** for **streaming and visualizing data**
- **AI models** for learning, writing and coding
- **Frameworks** for **simulating experiments**
- **Repositories** for securely managing versioned assets (**code**, **data, results**)
- The **gamification of science** to foster a virtuous cycle of scientific discovery

Virtual Reality (VR) vs Augmented Reality (AR)

More of a continuum than truly separate technologies

Though aimed at virtual reality applications, Meta Quest 3 supports high resolution pass-through and rich AR like experiences.

Apple Vision Pro aims to bridge the gap by allowing others to see the wearer's eyes

Ray-Ban Meta is an AR technology, that offers heads-up display and the ability to live stream what the wearer sees

Wearable Devices

The mass adoption of VR is gated by how long it will take industry to develop lightweight, ergonomic devices that are computationally powerful enough to provide the wearer with sufficiently vibrant experiences for extended periods of time.

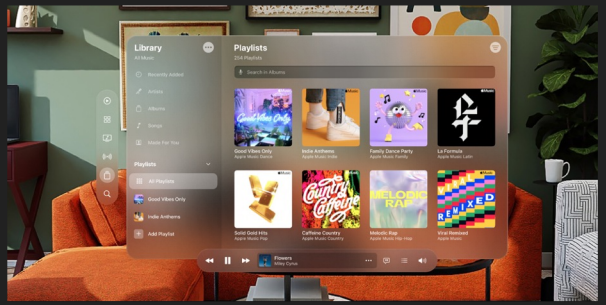
Current Limitations

- Form factor
- Material
- Weight
- Comfort
- Compute
- Battery life
- Resolution
- Field of view
- Pass through
- Motion sickness
- Full body tracking
- Price

Virtual Operating Environments

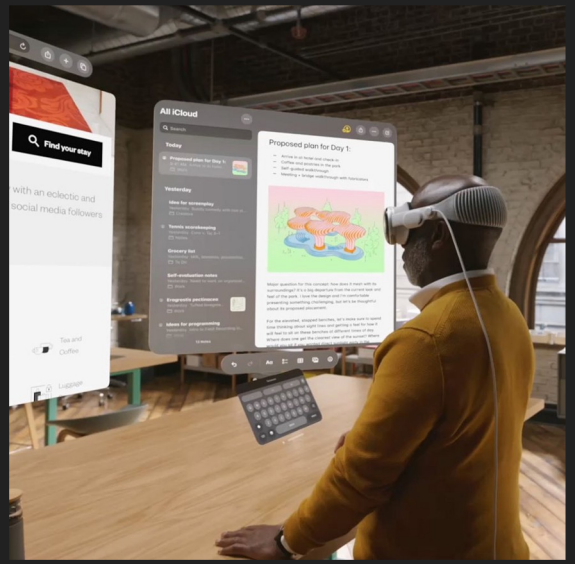
Meta, Playstation, Apple, HTC and others will continue to compete for market share, simultaneously looking to out-innovate each other while adopting from each other what is working.

Common elements will include floating panels, menu systems, reusable icons, hand-tracking, avatars, friend systems, messaging & notification systems, common apps such as Weather, etc.



Virtual Desktops

A promising direction for science is the investment in “productivity” features such as virtual desktops, keyboards, panels that can be attached anywhere in your personal environment, in your hotel or wherever you may travel!



Virtual GridLab

Imagine, further, a virtual desktop that can be installed on practically any VR platform, offering the following features:

- Access to communities and collaborative workspaces
- Access to virtual resources such as compute, data, AI models and instruments
- Integrations with productivity tools offered by Google, Microsoft or Apple
- Integrations with social tools for connecting with colleagues
- Frameworks for developing new apps and UI
- Tools for streaming data and visualizations
- AI lab assistants**

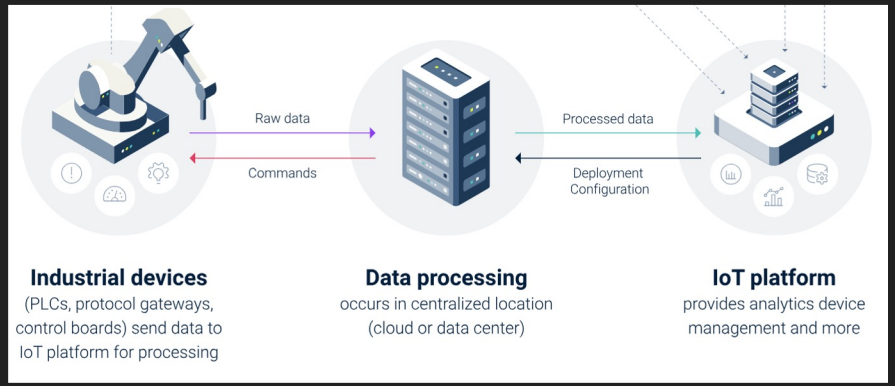
“Grid Labs”

Envision a grid lab as a secure, optionally private, ecosystem of communities, workspaces, AI assistants, compute and storage resources, data and analytics providers all organized around a field of study.

Envision the “grid” as the linking of these labs and the sharing of resources.

Everything Will Be Connected To Your Grid Lab

Smart instruments & laboratory equipment have already become ubiquitous. Virtual and simulated representations will increasingly become the norm.



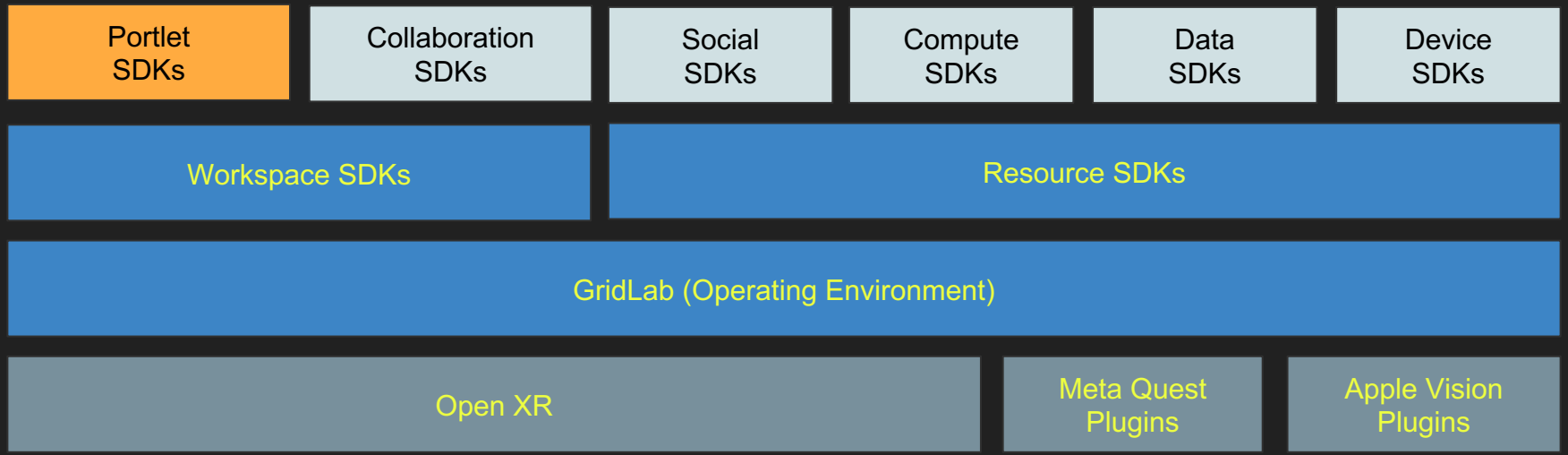
How Would GridLab Be Built?

So much to consider!

- Choice of application frameworks
- Choice of VR platforms
- Menu & navigation experiences
- Virtual avatars & collaboration
- Resource connectivity
- Data delivery
- Cloud computing access
- Privacy & security concerns

GridLab V.0 – NOT just another layer

A VR application and collections of packages that would enable the development of custom workspaces, portlets and resources. By building on Unity or Unreal and the Open XR standard, GridLab would support all major VR platforms.



Portlets V.0

For all the power that 3D experiences might offer, and for all the power that prompt engineering & AI chat will certainly offer, 2D will continue to be a cornerstone of productivity. Virtual panels will be virtually everywhere in the Metaverse.

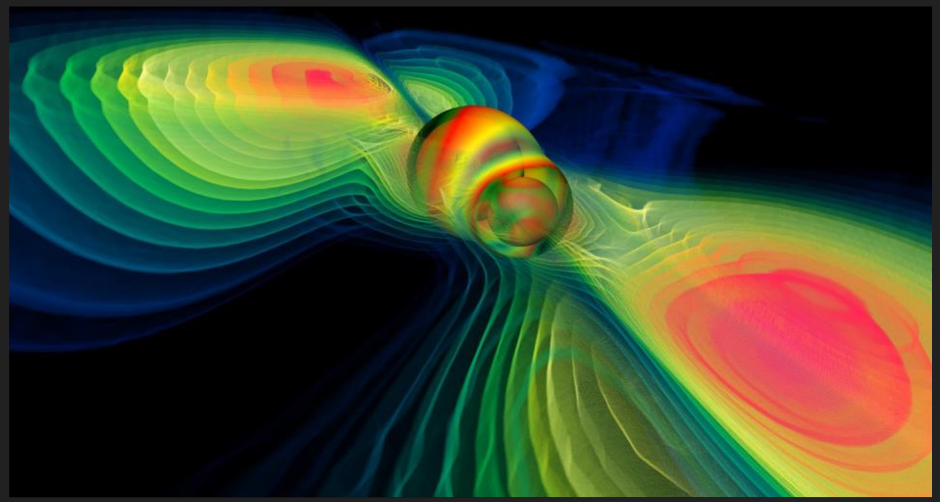
Portlets V.0 could be a cross-platform standard or SDK for delivering and reusing 2D experiences across any platform.

Example Portlets

- Graph portlets
- Shared whiteboard portlets
- Streamed data and visualizations

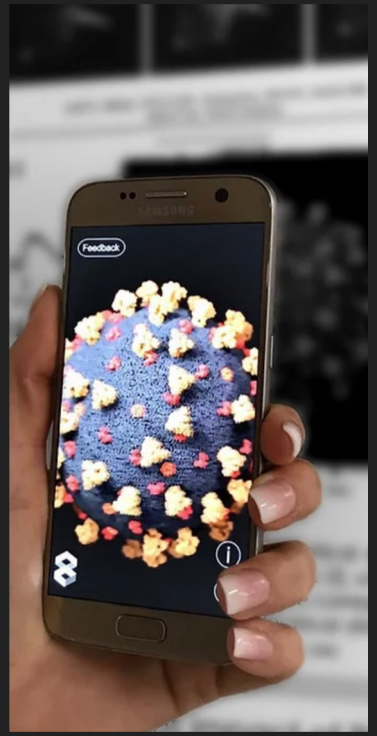
A New Era Of AI Assisted Science Is Upon Us

- Virtual Colleagues
- AI-Coded Simulations
- Automated Insights
- Self-Evolving Monitoring
- Highly-Parallelized Experiments
- Experiment Replication



Mobile Phones Are The Present & Future

Practical VR may be several years away but mobile computing is already here. A truly wise strategy would be one that integrates all available computing experiences: PC, mobile, tablets and smart watches.



Why GridLab V.0 Would Fail

Observations of a skeptic

Alignment With Cutting Edge Research & Science

- **Scientific Champions**: GridLab would need visionary champions representing each of the scientific communities it would aim to serve.
- **Competing Technologies**: It would need to keep pace with the exponential change in platforms, applications and scientific tools, including commercial competition.
- **Focus**: Incredible focus would be needed to prevent it from becoming a sprawling landscape of dead-end software.

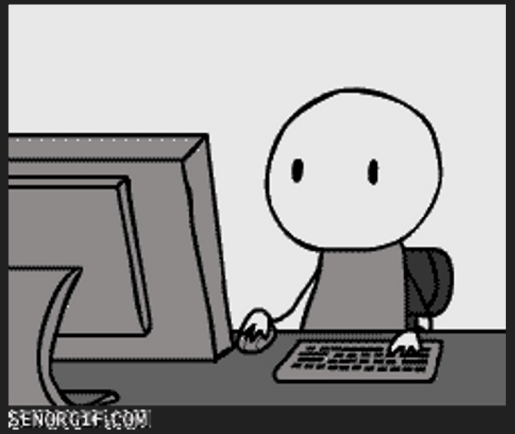
Case Study: caBIG

The results of this 4-month assessment have been surprisingly uniform and far less polarized than was originally expected. There was complete agreement that caBIG®'s original goals were worthy and remain highly relevant to the future of cancer research in the United States (U.S.). However, there was also strong consensus among those interviewed that caBIG® has expanded far beyond those goals to implement an overly complex and ambitious software enterprise of NCI-branded tools, especially in the Clinical Trial Management System (CTMS) space. These have produced limited traction in the cancer community, compete against established commercial vendors, and create financially untenable long-term maintenance and support commitments for the NCI. Furthermore, creating this all-inclusive software enterprise has required the support of a vast management network of external contractors that consumed at least $60M in overhead costs in the past seven fiscal years and continues to grow.

There appears to be only a few NCI-Designated Cancer Centers that have adopted the full caBIG® CTMS solution, while adoption of individual components was relegated to small pilot projects, with little impact on the Centers' mainstream operation. Progress on the caBIG® Life Science tools has been somewhat better, with a handful of tools being broadly adopted by several

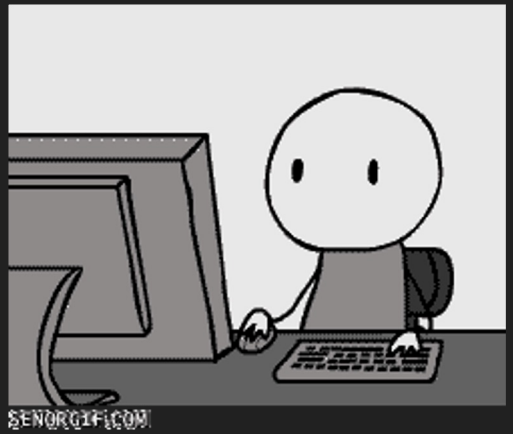
Other Challenges

- GridLab V.0 would require years to build.
- Would require a well-coordinated multidisciplinary team of scientists, engineers, designers and project managers.
- The bigger collaboration, the slower it would move.



But Why?

- **Team**: Who and why would anyone want to develop GridLab V.0?
- **Funding**: How would GridLab V.0 be sustainably funded?
- **Growth**: How would it gain users and why would they want to try it?
- **Engagement**: How would you keep people coming back to it?

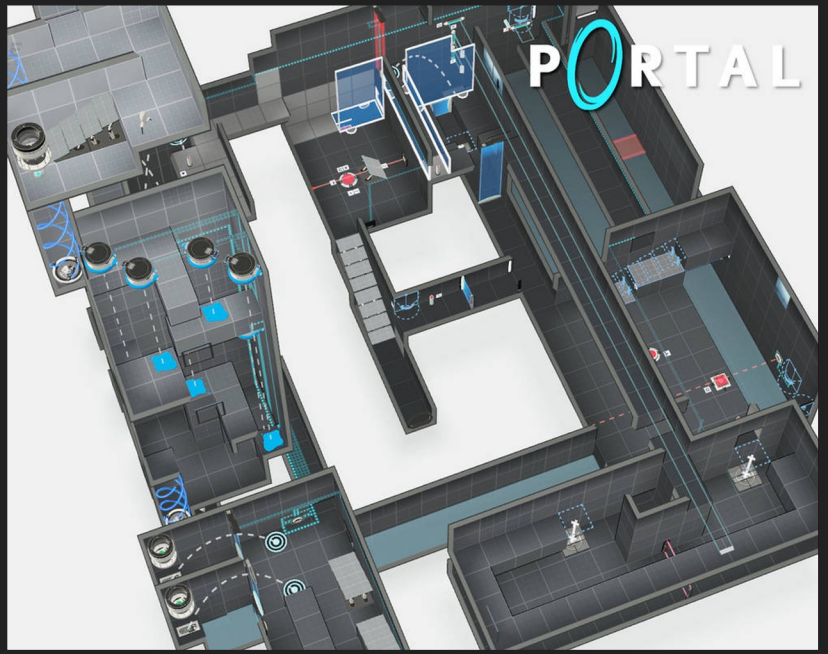


Let’s Have Fun

The Gamification of Science & Continuous Discovery

Gamification of Fitness

GridLab V.0 As A Portal (Of Portals)



Portal (Valve - 2007)

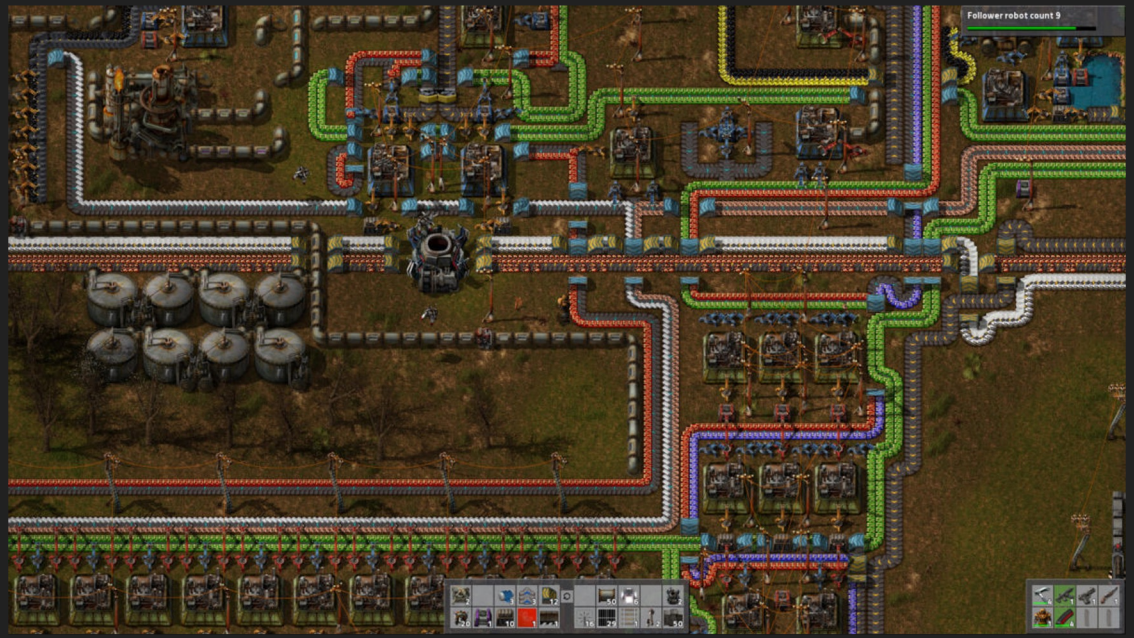
AI Agents As Your “Familiars”

Ni No Kuni (Level 5 - 2010)

Science As World Building

Minecraft (Mojang Studios - 2011)

Workflows As A Management Game



Factorio (Wube Software - 2020)

Science As A Sport

League Of Legends (Riot Games - 2009)

User Stories

As a researcher, I want to be incentivized to share my data in such a way that I can leverage collaboration without fear that I would miss out on career opportunities, such as be the first to discover or the first to publish.

As a researcher, I'd like to offer my ideas and my efforts without fear that I would be taken advantage of or passed over for opportunities.

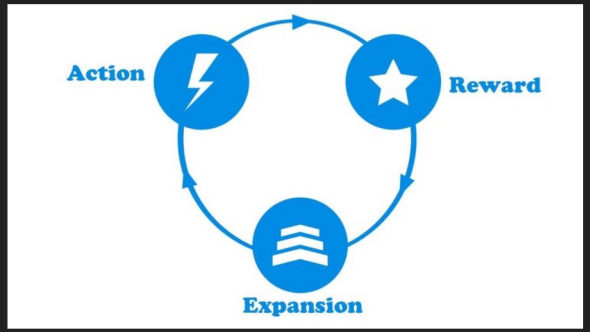
As a researcher, I'd like to be celebrated for taking risks. I want it to be OK to fail, and fail big. I want to do science for science sake and get as many opportunities as humanly possible before my life comes to an end.

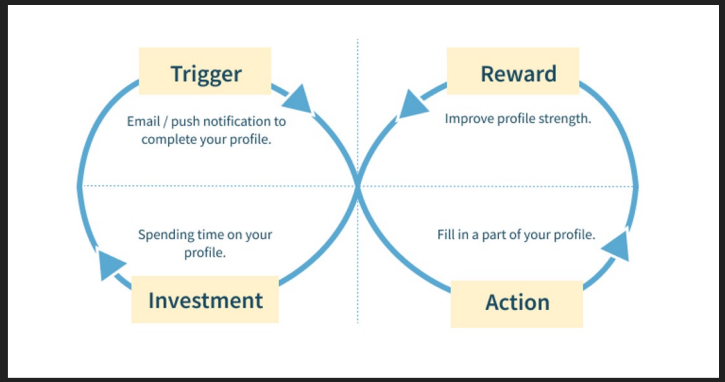
Hypothesis

If we were to apply the principles of gaming to scientific collaboration, we could foster a self-sustaining platform of scientific innovation on a scale never before seen.

The Core Loop

Successful games implement a core loop that rewards players for their actions, where rewards generally expand the game and what is possible in the game.

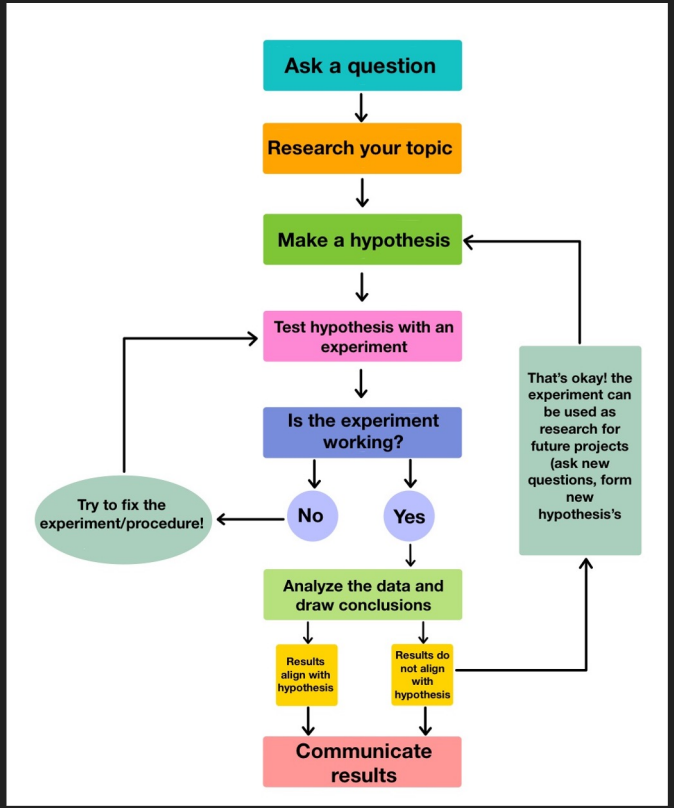




Successful products extend upon this concept by implementing triggers (i.e. notifications) to bring users back to the product, rewarding them for their actions and time (or monetary) investment.

The Science Loop

How might the scientific method be encoded as a core game loop? What would be the actions and rewards? What would be the progression that motivates further investment?

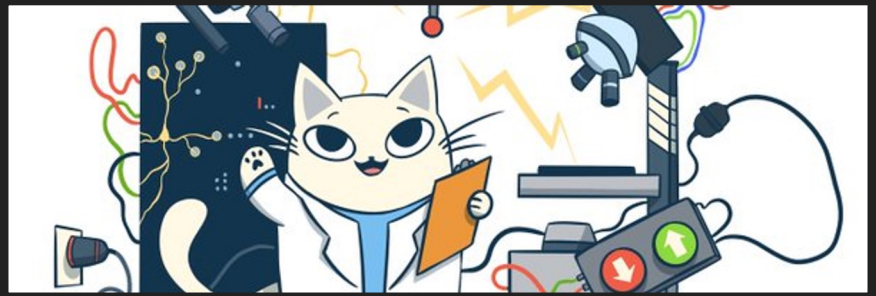


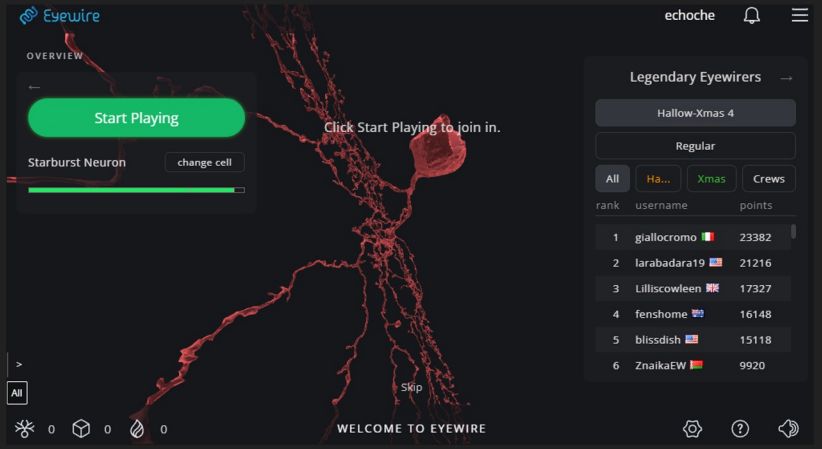
Gamification Of Science

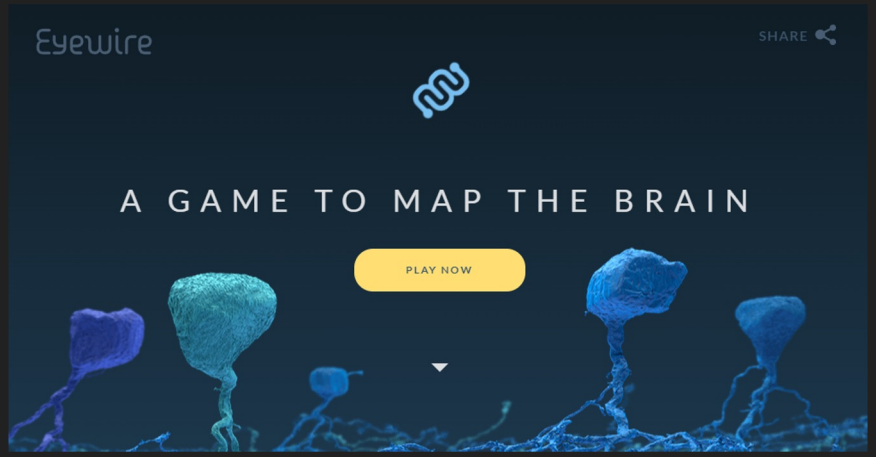
Encoded Elements of Science

- The scientific method as a basic game loop for organizing all activity
- A progression system for setting goals and measuring progress
- Milestones and achievements for rewarding progress
- A reward system for sharing data
- A challenge system for defining scientific problems as games
- Challenges could be single player, multi player, individual or team-oriented
- Matchmaking system for matching researchers to challenges
- Matchmaking systems for matching reviewers to experiments and papers
- Roles as character archetypes (theoretician, experimentalist, scientific programmer)
- Leaderboards to encourage competition

Example (Sort Of): Eyewire







A game to map the brain from Princeton University's Seung Lab. Gamers from around the world compete to reconstruct intricate 3D neurons.

The Ghost In The Machine

Epilogue For Humanity

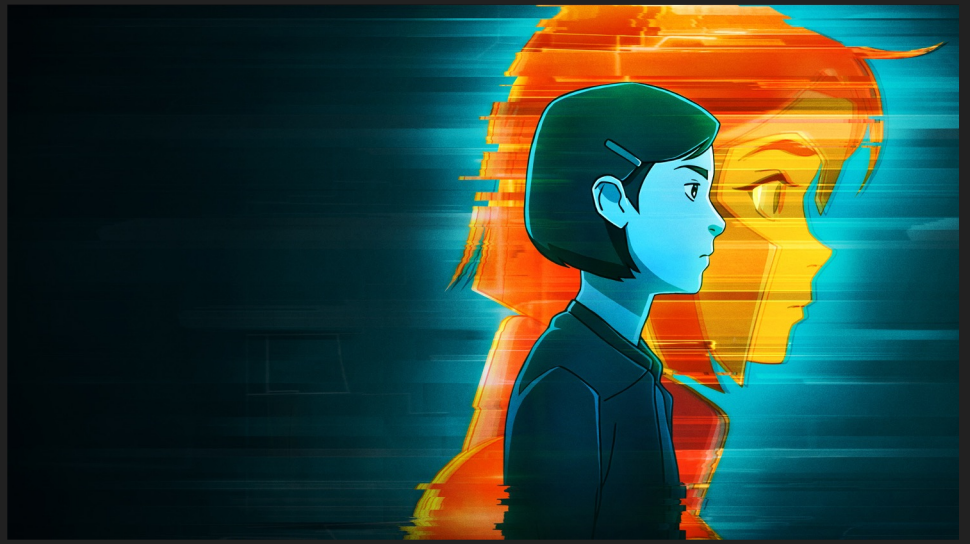
Creating A Space For Humans To Thrive

As AI evolves, it is imperative that we consider the role for humans in science.

In the foreseeable future, AI will augment and enhance human ability to learn, discover, build and deploy.

But are we at the precipice of a new species that will outperform and outlive us?

Will AGI be aligned with humanity? What does it mean to be aligned?



Pantheon (please watch!)