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IAN HUGHES / @EPREDATOR

DOCTOR OF TECHNOLOGY(HONS)

[EPREDATOR@FEEDINGEDGE.CO.UK](mailto:EPREDATOR@FEEDINGEDGE.CO.UK)

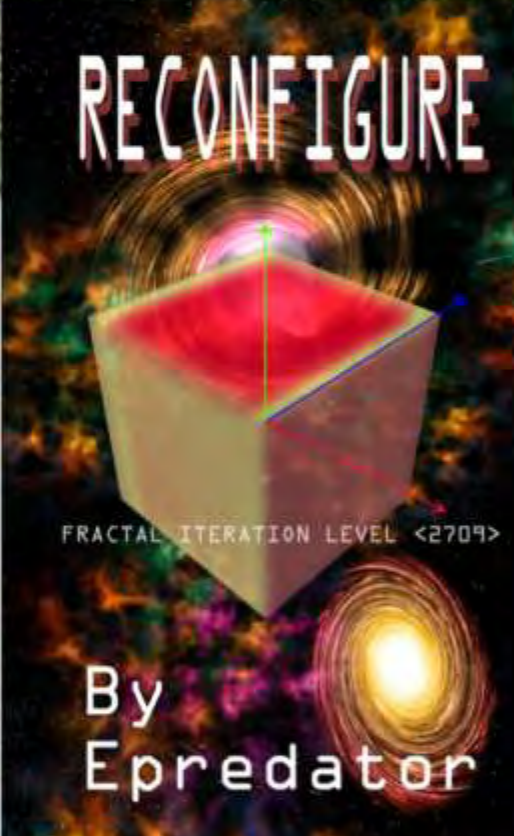
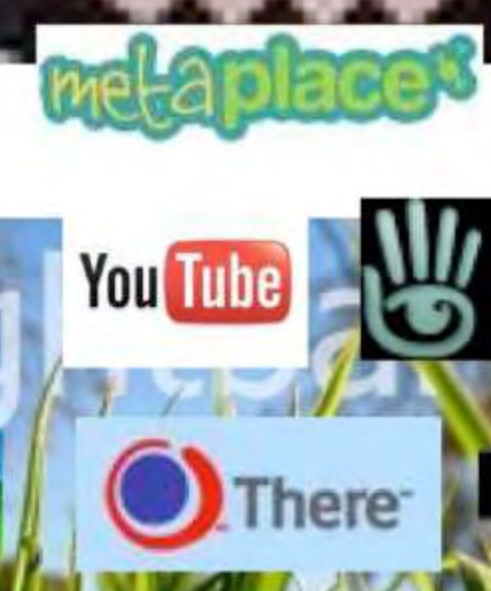
BCS ANIMATION AND GAMES

\*OPINIONS ARE MY OWN



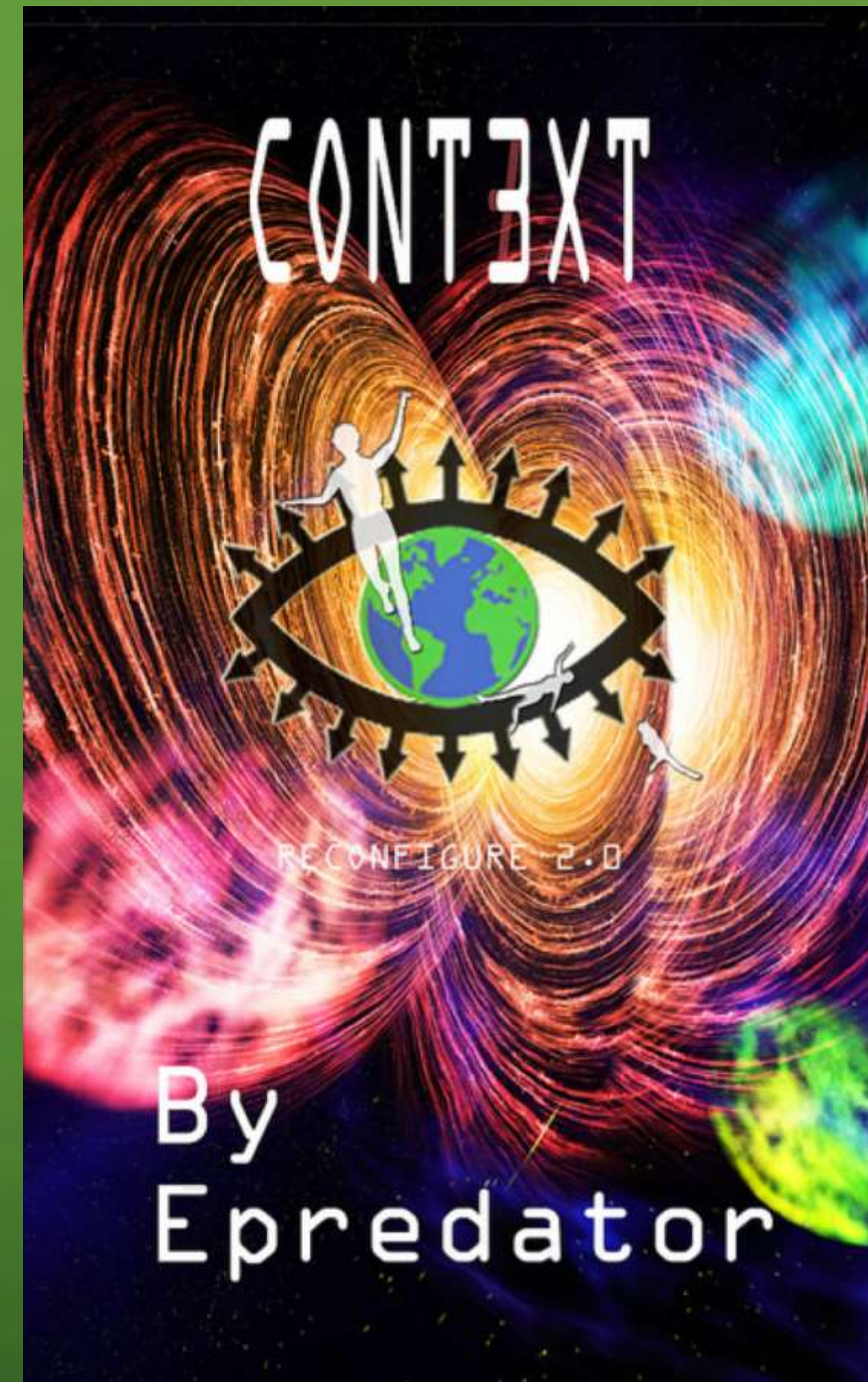
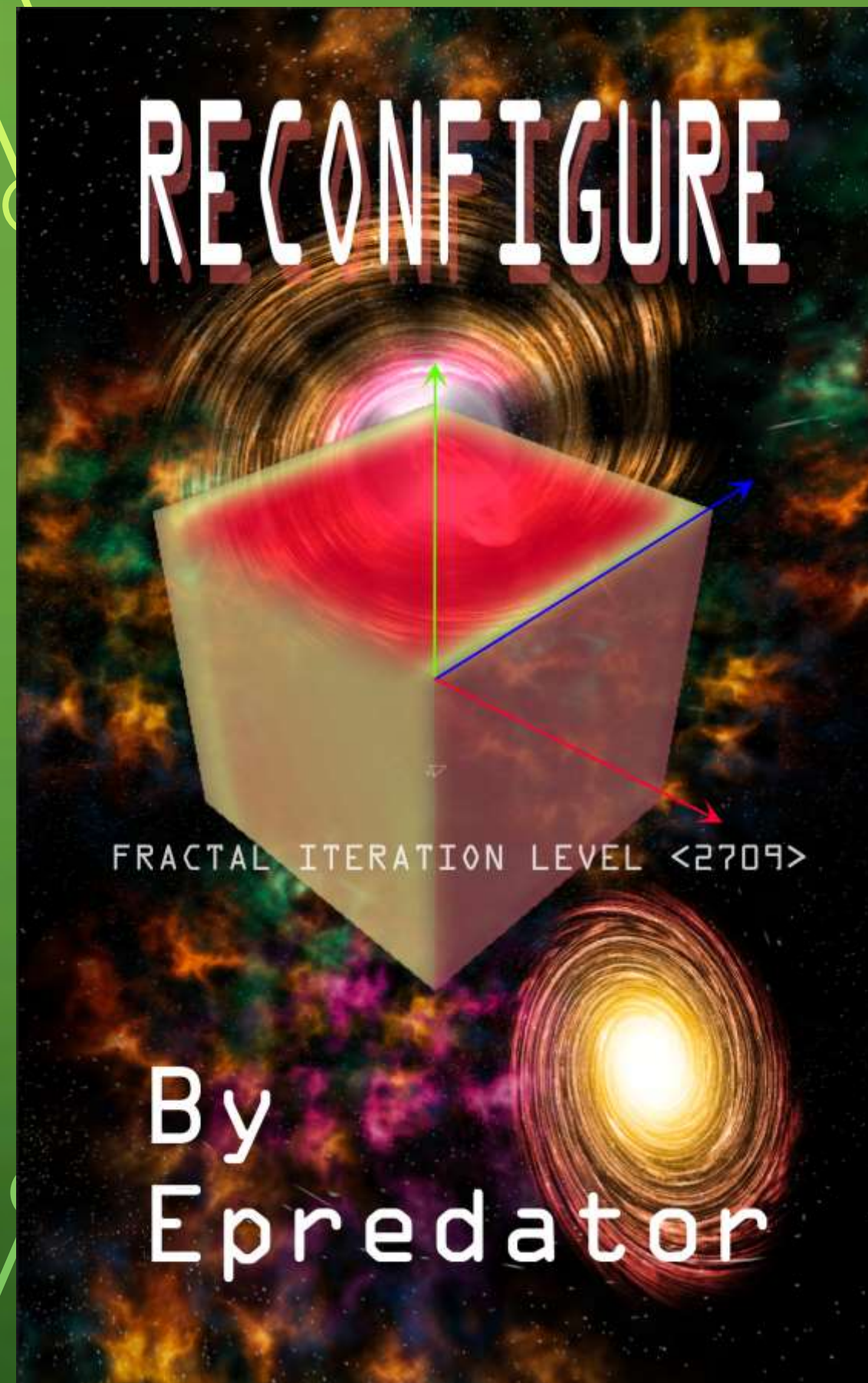


epredator's workplace





## ALSO SCI-FI AUTHOR



- The written word still very important
- Near now technology
- **AR, VR, Quantum, IoT (etc.)**
- Roisin is a gamer and developer
- <http://reconfigurebook.co.uk>
- <http://cont3xtbook.co.uk>
- Just 99p on Kindle :)





# EVOLUTIONARY MOMENT

- A year ago I presented to Bournemouth Natural Science Society
- I decide to genAI an image
- Using Midjourney
- /imagine Bournemouth natural science society





## THIS YEAR I TRIED AGAIN

- Same prompt
- New image
- Midjourney gen AI
- /imagine Bournemouth natural science society
- Will come back to this image
- See if you can spot why



# CONFUSING LIST OF ACRONYMS

Quantum  
Digital Twin  
Cybernetics

AR  
Edge  
IoT

VR  
Metaverse  
GANs

USD  
Cloud

Industry 4.0/5.0  
Spatial Computing  
Open Source

AI  
LFD  
MR

Web 3.0  
ML

Blockchain  
Crypto

XR  
CRISPR

QC  
FinTech  
LLM

AGI

BCI  
NFT  
GenAI

AGV  
RPA  
5G/6G  
NPC

Gaussian Splatting

# CONFUSING LIST OF WORDS

Artificial General Intelligence(AGI)      Open Universal Scene Descriptor (USD)  
Quantum Computing      Virtual Reality(VR)      Cloud Computing  
Digital Twin      Generative Adversarial Networks (GANs)  
Cybernetics      Edge Computing      Spatial Computing  
Artificial Intelligence (AI)      Metaverse      Industry 4.0/5.0      Open Source  
Light Field Displays(LFD)      Internet of Things (IoT)      Quantum Cryptography      Autonomous Guided Vehicle(AGV)  
Mixed Reality(MR)      FinTech      Large Language Model(LLM)      Robotic process automation (RPA)  
Web 3.0      Machine Learning(ML)      Brain Computer Interface (BCI)      5G/6G      Gaussian Splatting  
Blockchain      Extended Reality(XR)      Generative AI(GenAI)      Non player character(NPC)  
Cryptocurrency e.g Bitcoin      Non-Fungible Token(NFT)  
Clustered Regularly Interspaced Short Palindromic Repeats (CRISPR)



# CONFUSING LIST OF WORDS

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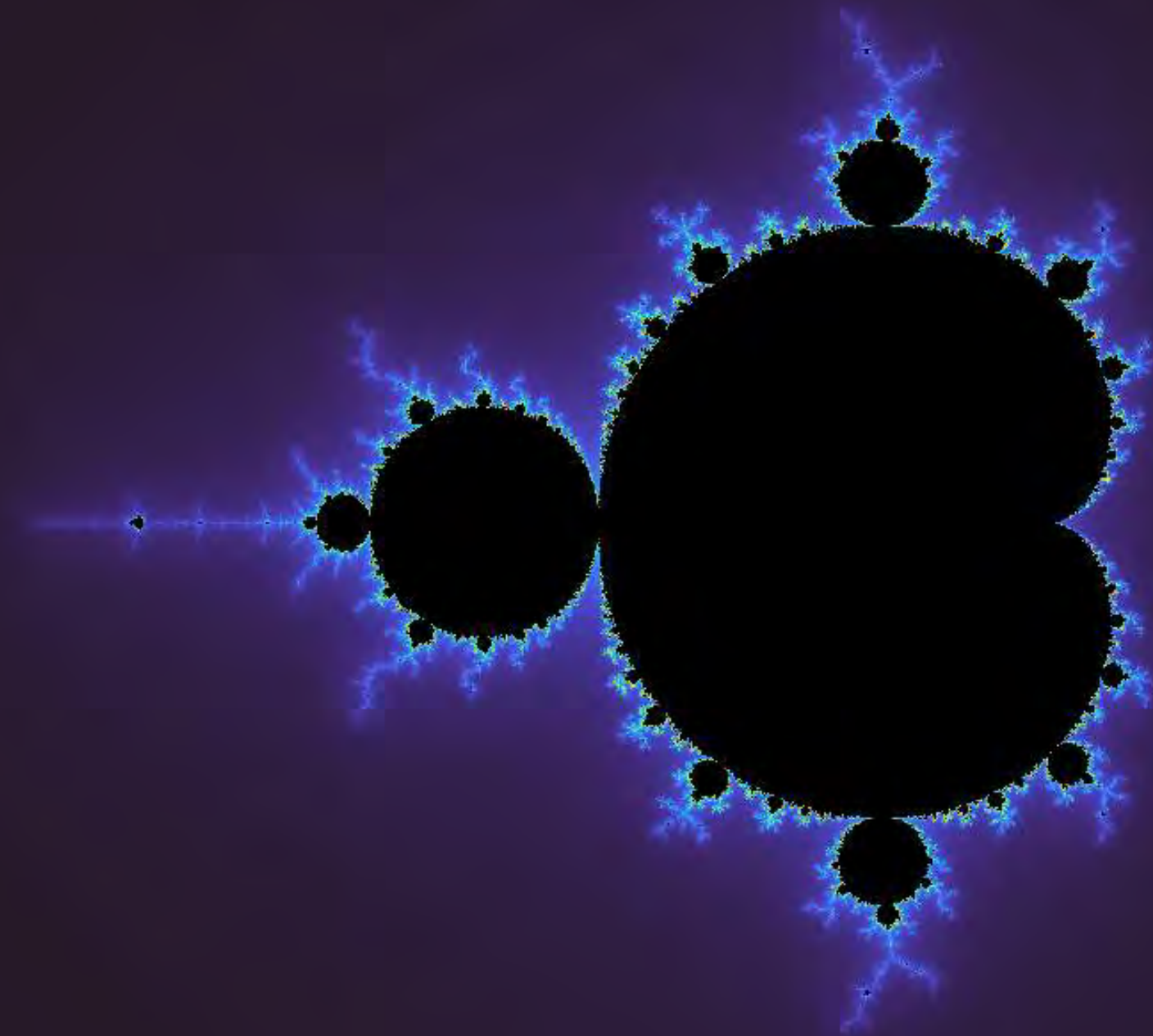


# PAUSE FOR THOUGHT

- How I think about technology
- Or anything for that matter
- Path to some level of understanding
- With the fact the more you know the more you realize you don't know anything
- "We're blind to our blindness. We have very little idea of how little we know. We're not designed to know how little we know." Daniel Kahneman

"pause for thought" prompt in Midjourney made the image

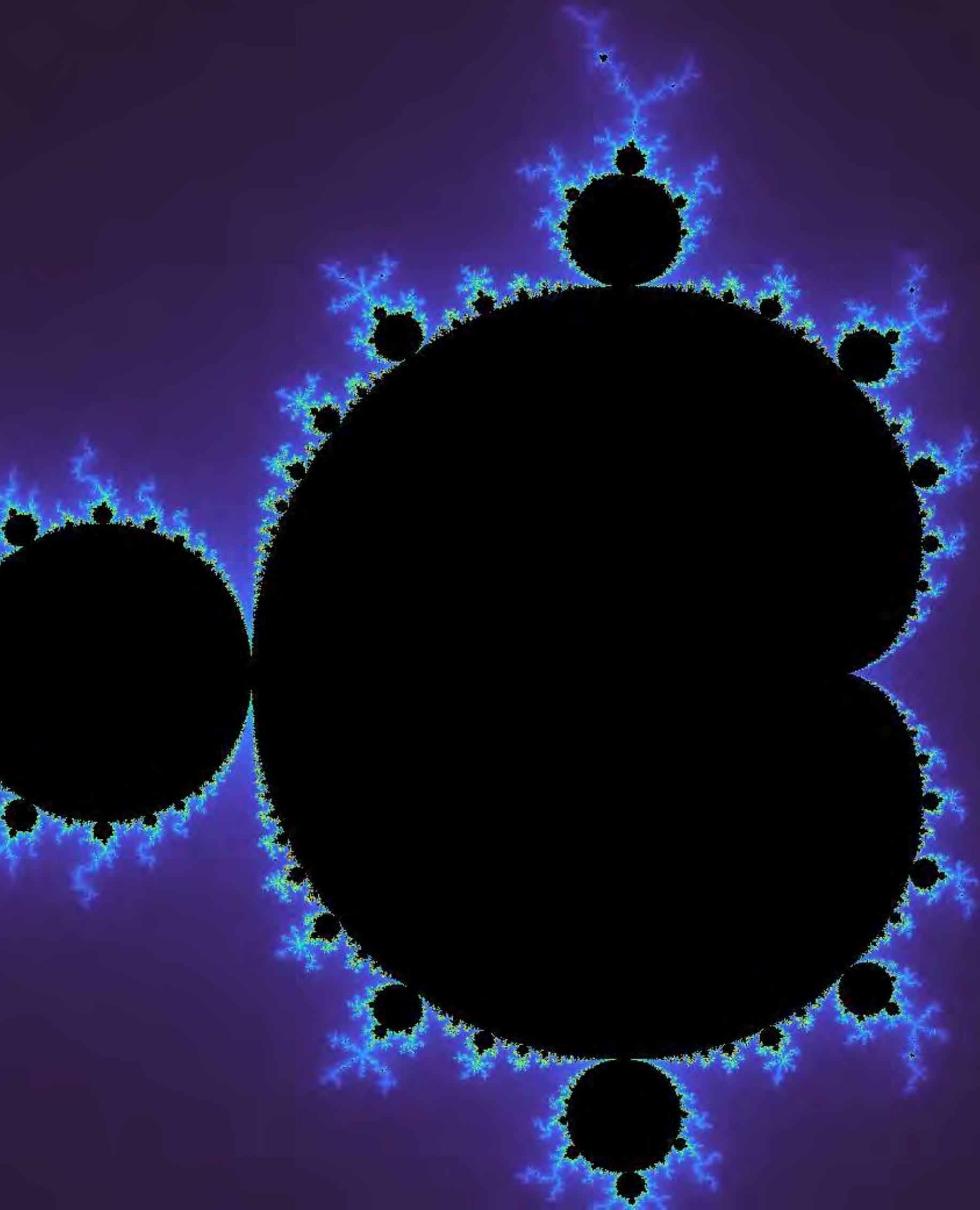




# FRACTAL THINKING

- Mandelbrot set
- An infinite world in a finite space
- Simplicity and complexity

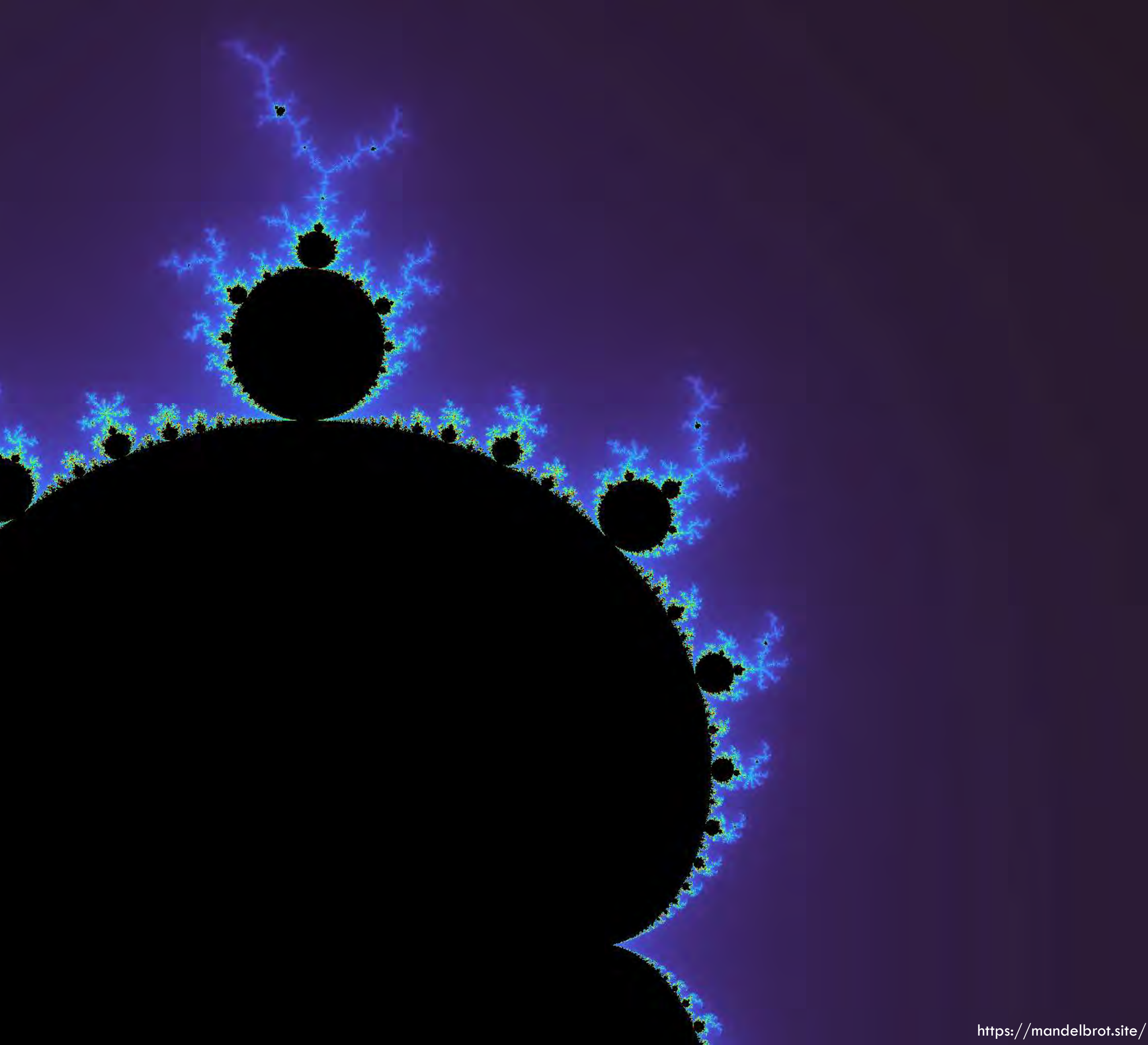




# FRACTAL THINKING

- Zooming in



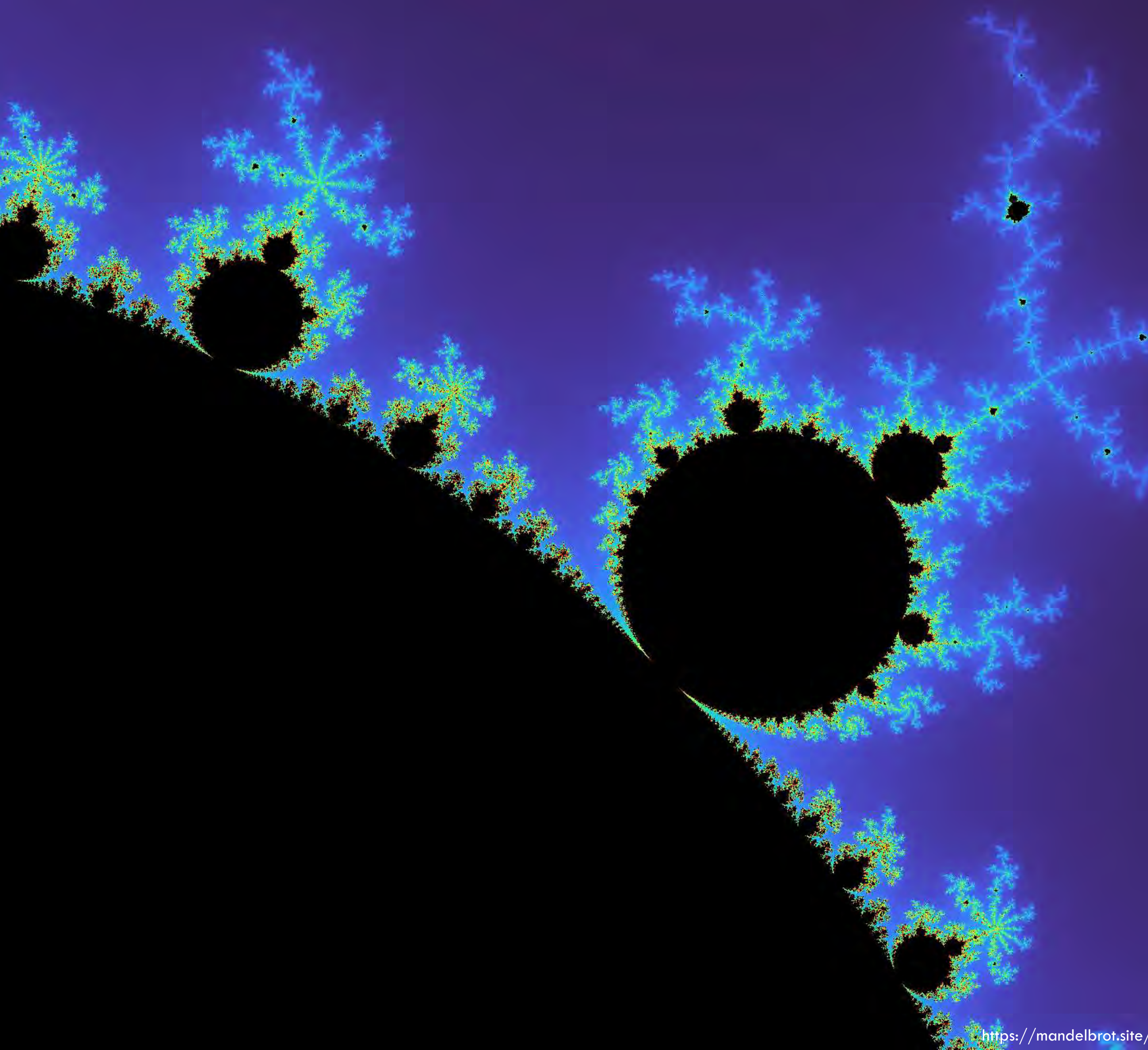


# FRACTAL THINKING

- Patterns repeat





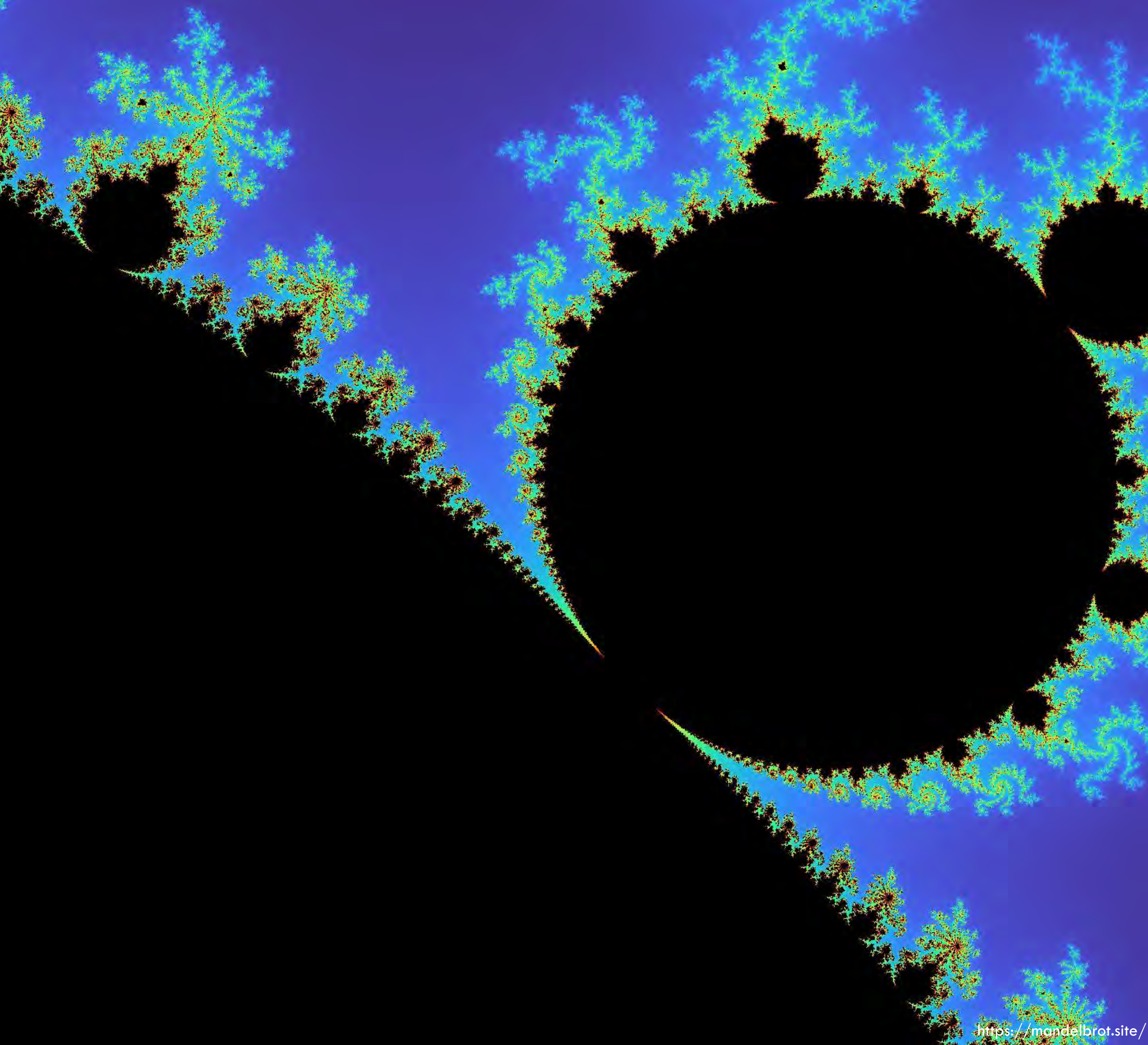


# FRACTAL THINKING

- And repeat





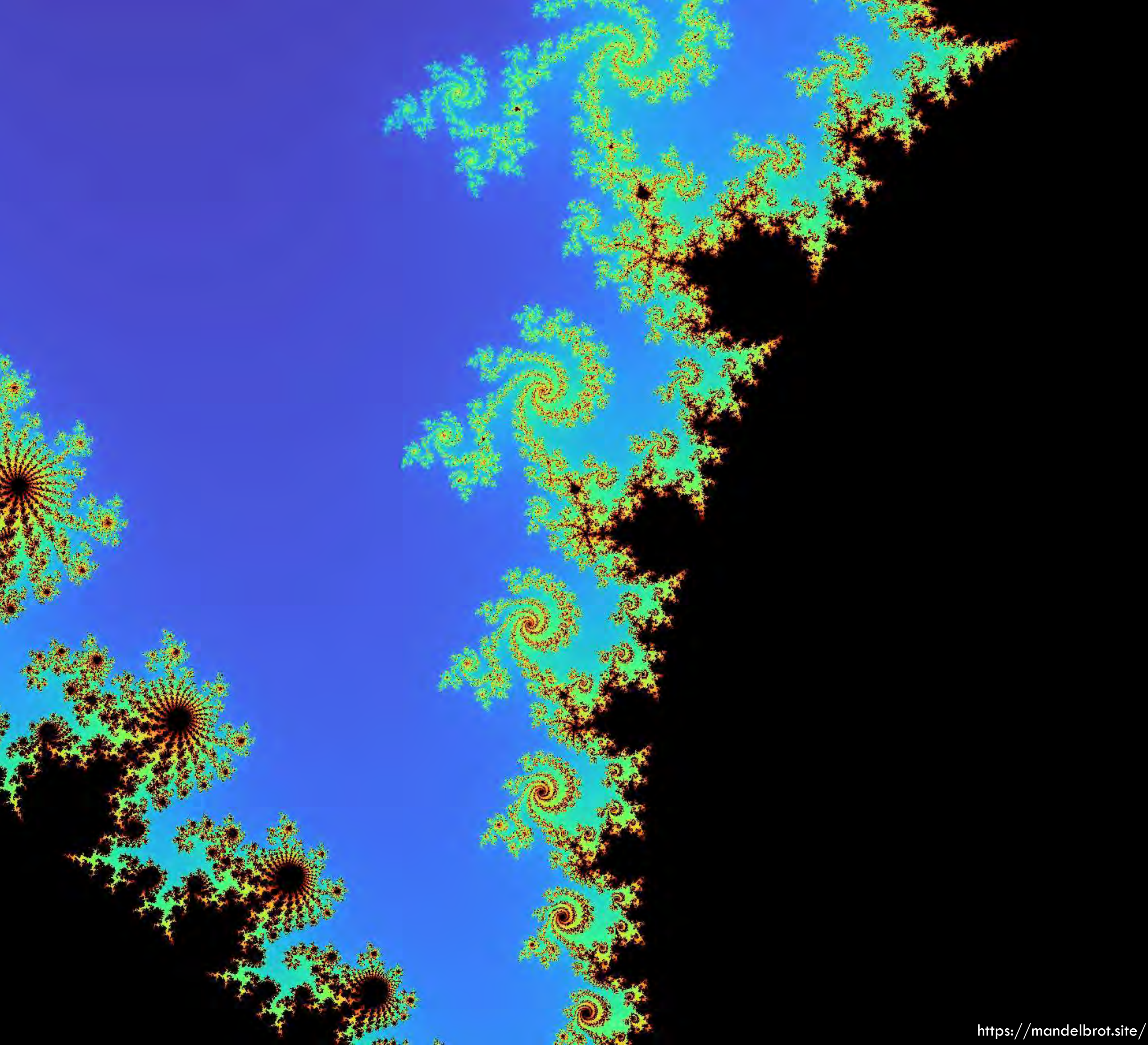


# FRACTAL THINKING

- And repeat





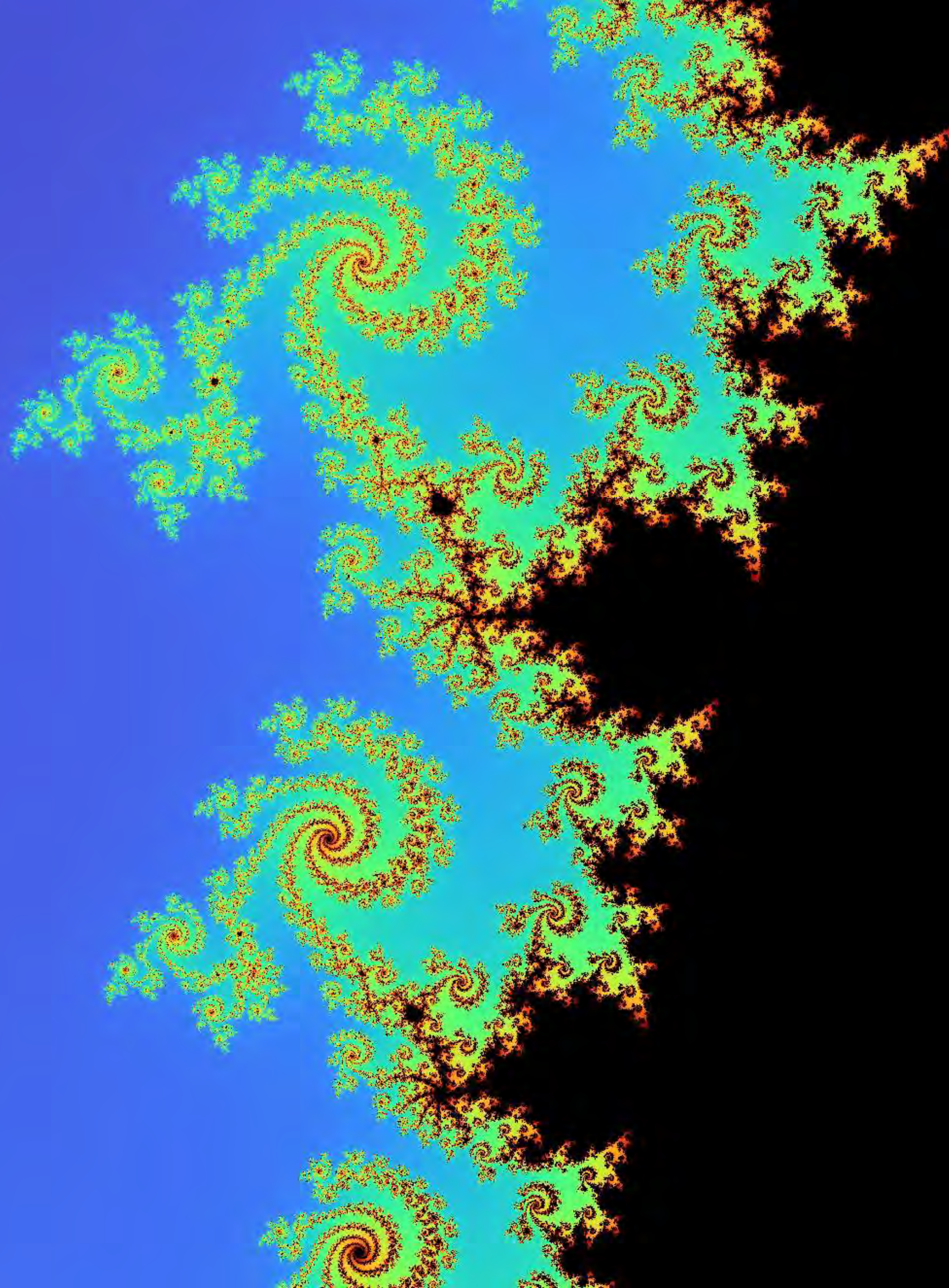


# FRACTAL THINKING

- And repeat



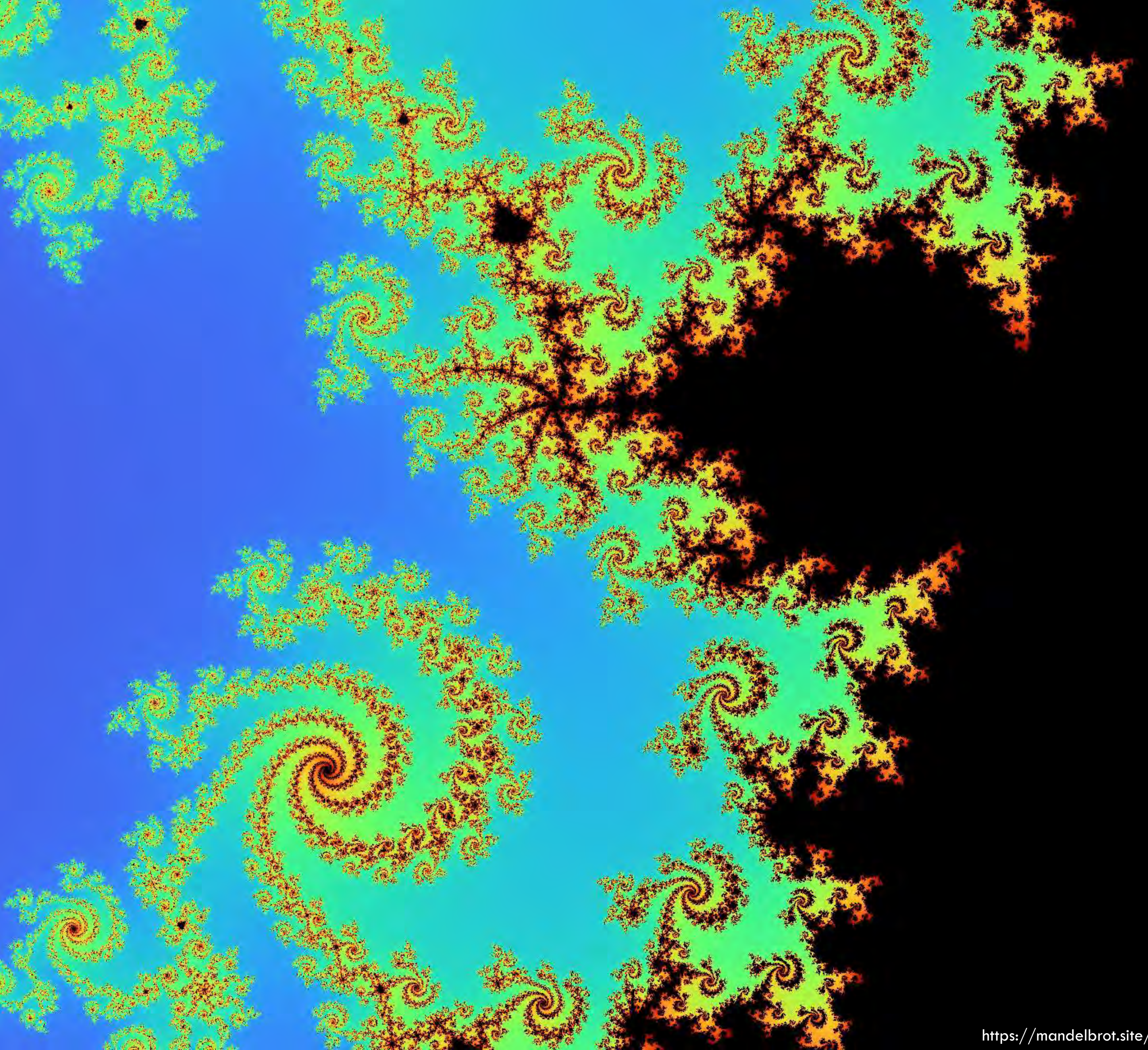




# FRACTAL THINKING

- And repeat . You get the idea!



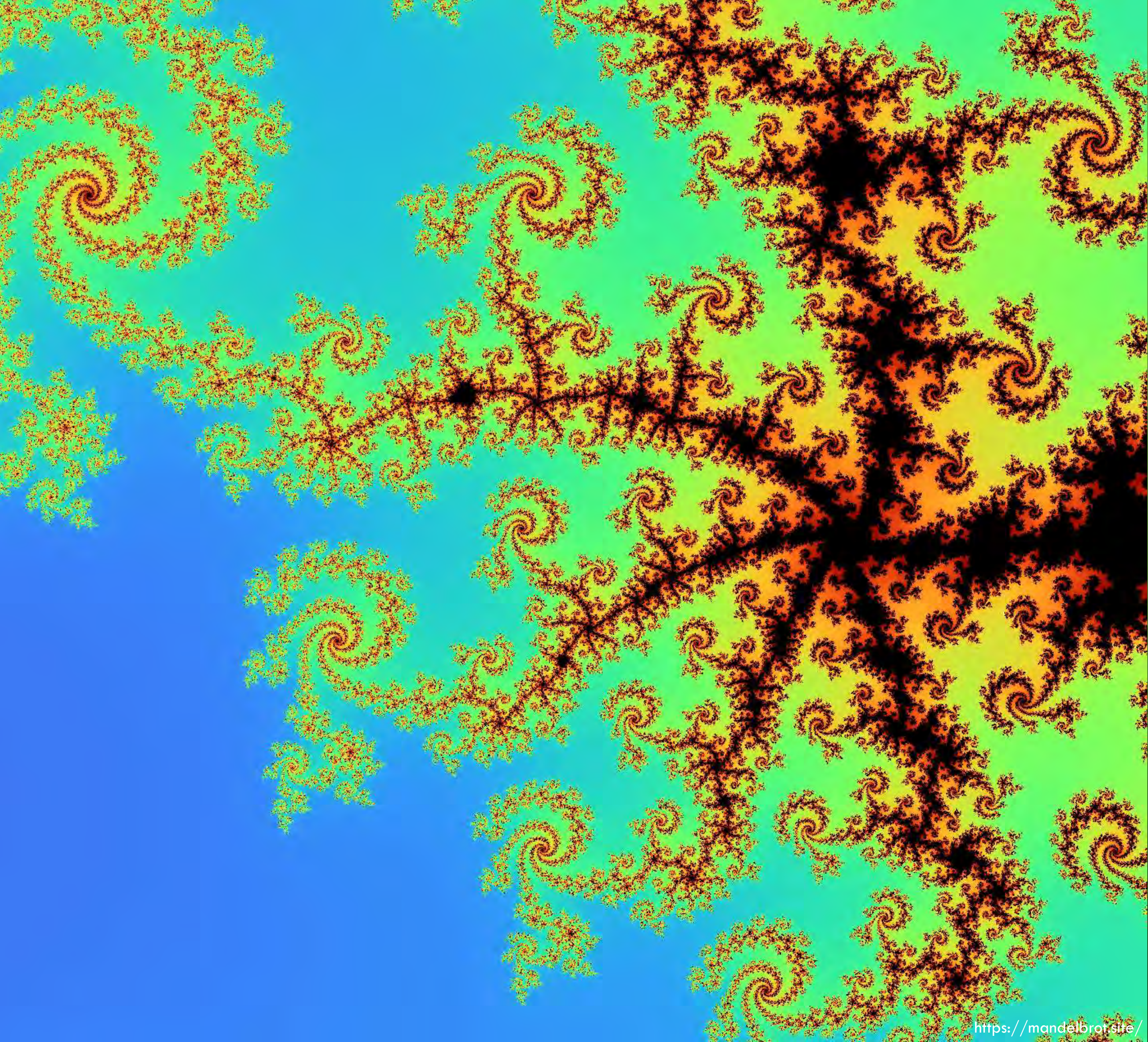


# FRACTAL THINKING

- Never ending





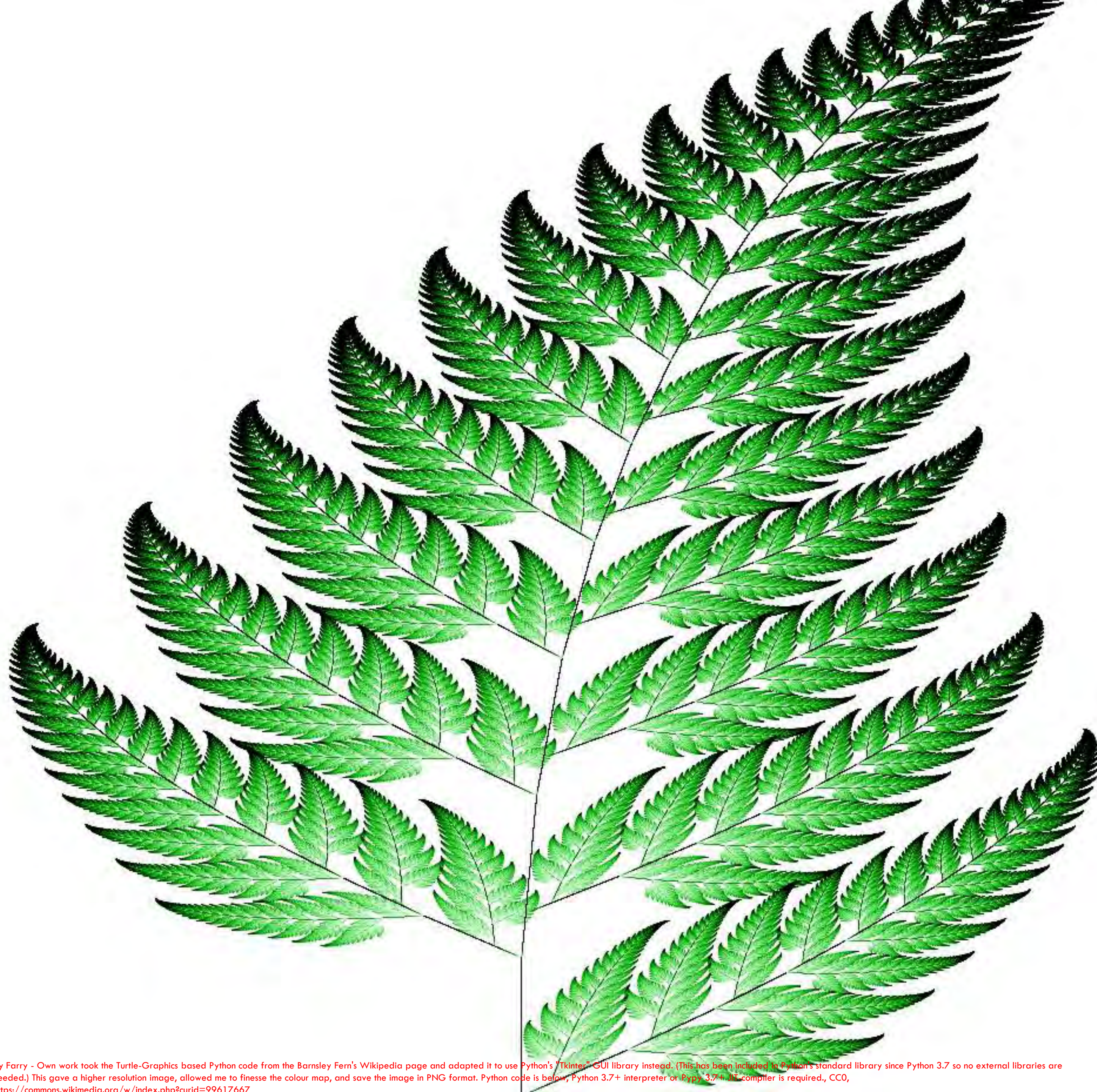


# FRACTAL THINKING

Will stop here!







# FRACTAL NATURE

## BARNSLEY FERN

```
draw all pixels on screen white
x = 0.0
y = 0.0
t = 0.0
xn = 0.0
yn = 0.0
while t < maximum iterations:
    r = random() between 0 and 1
    if r < 0.01:
        xn = 0.0
        yn = 0.16 * y
    else if r < 0.86:
        xn = 0.85 * x + 0.04 * y
        yn = -0.04 * x + 0.85 * y + 1.6
    else if r < 0.93:
        xn = 0.2 * x - 0.26 * y
        yn = 0.23 * x + 0.22 * y + 1.6
    else:
        xn = -0.15 * x + 0.28 * y
        yn = 0.26 * x + 0.24 * y + 0.44
    draw green pixel on screen at (xn, yn)
    x = xn
    y = yn
    increment t
```

[https://en.wikipedia.org/wiki/Barnsley\\_fern](https://en.wikipedia.org/wiki/Barnsley_fern)



PHILOSOPHICAL CONCEPTS TOO  
YIN AND YANG  
INFINITE YET CONTAINED, SIMPLE YET COMPLEX





# AN ACTUAL FULL CIRCLE, SERENDIPITOUSLY





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Edge Computing

Industry 4.0/5.0    Open Source

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# GROUPED CONFUSING LIST OF WORDS

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Gaussian Splatting

Digital Twin



# TYPES OF COMPUTING (START EASY)

## Cloud

- Computing and/or Data is a significant distance away and more “virtual”
- Can stream output (e.g. cloud gaming)

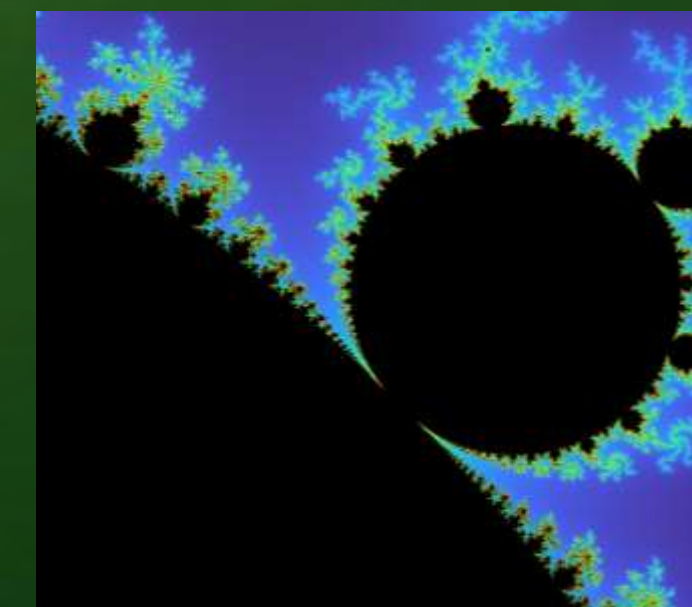
## Edge

- Computing and/or Data is closer and more “physical”

It's all a continuum

And a fractal pattern

Input / process / output





# ALL THE G'S (GENERATIONS) IN MOBILE PHONE/DATA

3G Circuit switching voice plus some data packet switching

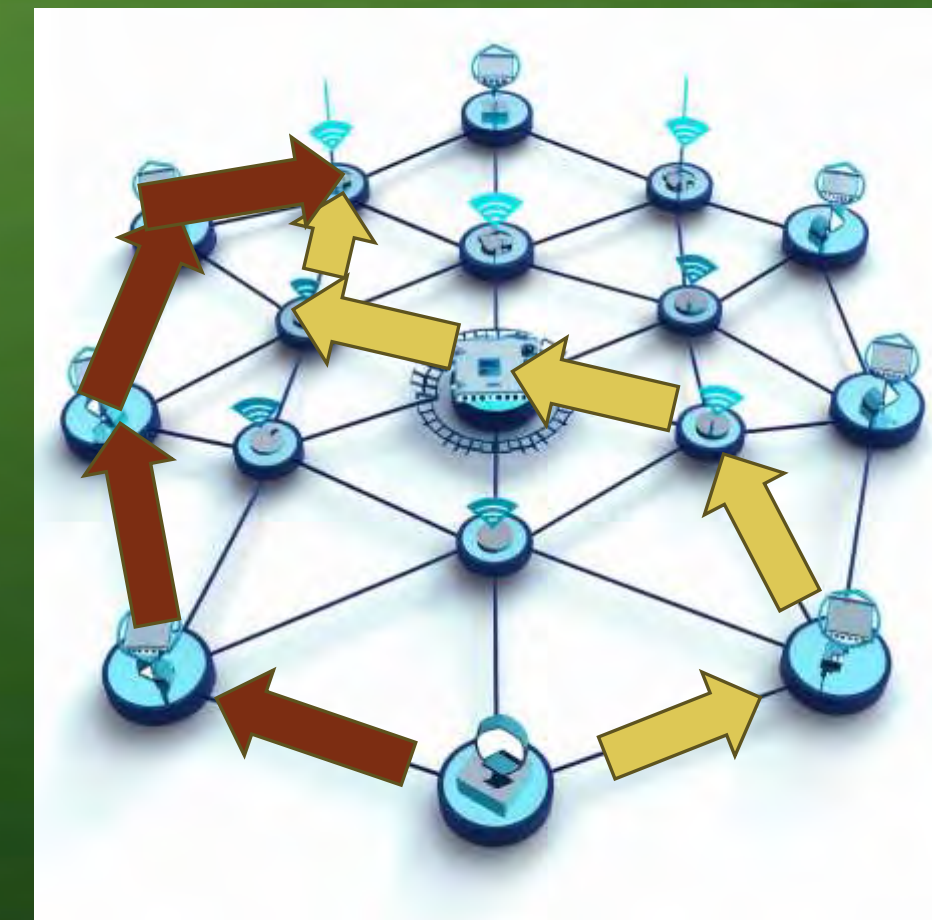
4G All packet switch no circuits

5G Added network slicing (digital control of what gets priority)

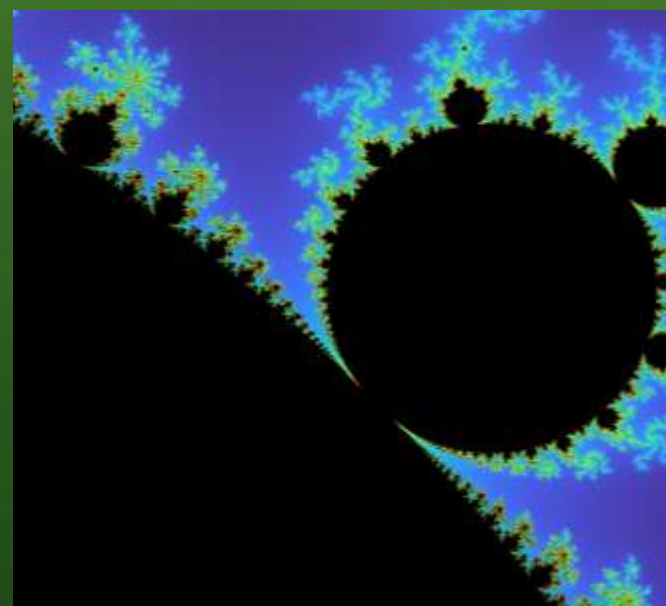
6G (2030) AI assisted 5G plus higher frequencies



Circuit switching



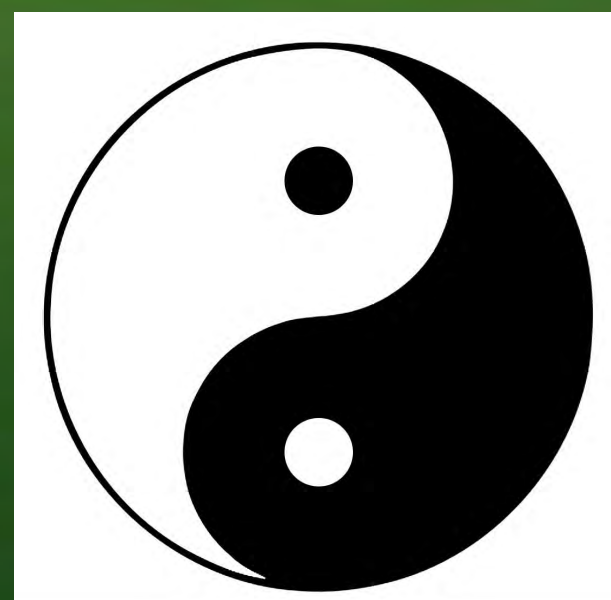
Packet switching





# QUANTUM COMPUTING (THIS ONE IS VERY TRICKY)

- Conventional digital computers use 1's and 0's to represent data (bits)
- Processing is done through constant iteration until an answer is reached
- Quantum computing works on every possibility between 1 and 0 (qubit)
  - This is called super positioning
  - Note similarity to the randomness of probability 1 to 0 used in the fern leaf
- Qubits can be “entangled”, value depends on that of another entangled qubit (regardless of distance)
- All happens at the edge of “normal” physics towards absolute zero temperature
- Looks at all states of a problem space at once, results are probabilities
- Another angle on scale/possibilities – A deck of 52 playing cards has around  $8 \times 10^{67}$  combinations (52!)





# QUANTUM COMPUTING USE CASES

## 1. Drug Discovery and Molecular Simulation

- **Problem:** Traditional computers struggle to simulate the complex interactions between molecules accurately due to the sheer number of quantum states involved.
- **Quantum Solution:** Quantum computers can model these interactions at the quantum level, enabling precise simulations of molecular structures and dynamics. This can lead to the discovery of new drugs and materials much faster than classical methods.

## 2. Optimization Problems

- **Problem:** Many industries face complex optimization problems, such as optimizing supply chains, traffic flow, and financial portfolios, which are computationally intensive for classical computers.
- **Quantum Solution:** Quantum computing can solve these optimization problems more efficiently using algorithms like the Quantum Approximate Optimization Algorithm (QAOA). This can lead to significant improvements in logistics, cost savings, and operational efficiency.

## 3. Cryptography and Cybersecurity

- **Problem:** Current encryption methods rely on the difficulty of certain mathematical problems, which could be easily solved by quantum computers, potentially compromising data security.
- **Quantum Solution:** Quantum computing can both break existing encryption methods (such as RSA) and develop new, quantum-resistant cryptographic algorithms. Quantum key distribution (QKD) offers theoretically unbreakable encryption based on the principles of quantum mechanics.



# HOW WE EXPERIENCE COMPUTING (EASY-ISH)

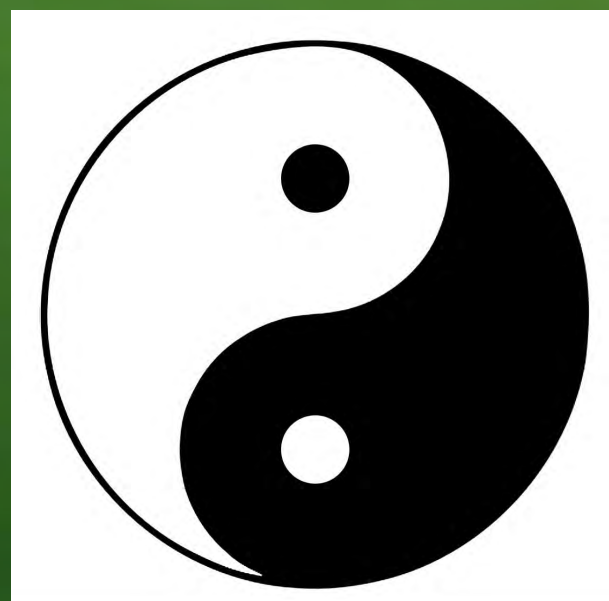
Is this 2D or 3D?

Is this virtual or real?

Is it digital or physical?

Mobile or static?

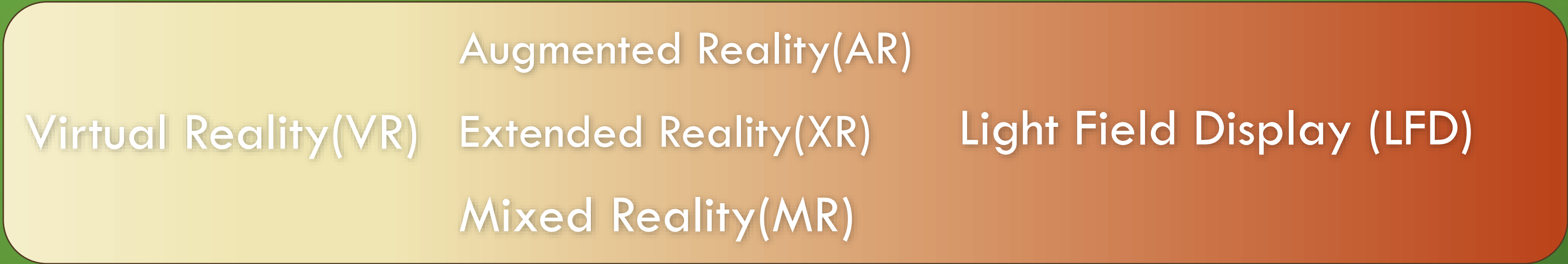
Fixed view or dynamic view?





# THE “REALITIES”

Displays and inputs – typically interact with user movements in 3D space



3D input/output  
6 Degrees of Freedom (6dof)

Audio? 3D? Spatial?



2D/2.5D  
input/output

Spatial Computing – All of the Above – Mainly one company trying to differentiate

Also now Volumetric computing



# WHICH DIGITAL REALITY? THE METAVERSE

Metaverse – What and where you interact digitally in real time

Regardless of the screen type or any input/output devices

S&P Global defines the metaverse as the **long-term vision** for the next phase of the internet, which will feature a single, shared, immersive and persistent 3D virtual space where **humans and machines interact** with one another and with data, **enhancing the physical world as much as replacing it.**

<https://www.spglobal.com/en/research-insights/special-reports/metaverse-and-generative-ai-envisioning-the-future-of-human-computer-interaction>





# CREATING AND MANIPULATING 3D CONTENT



Traditional Polygons  
Combining Triangles

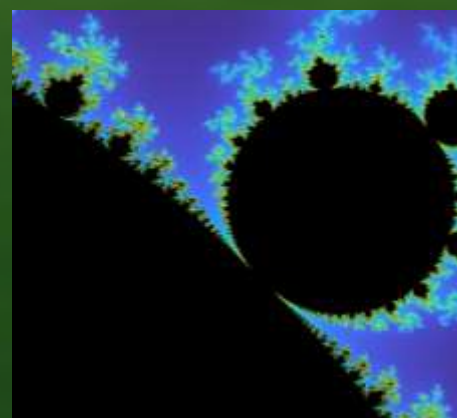


Gaussian Splatting  
Mathematical curves  
combined



Neural Radiance Fields (NeRFs)  
AI models trained to recreate a 3D  
scene from any view point

Open Universal Scene Descriptor (USD) – Emerging standard linking many 3d, animation, metaverse tools - Level above 3D Model – what is this thing, what can it do, where does it fit.





# INTERNET OF THINGS (IOT) AND DIGITAL TWINS

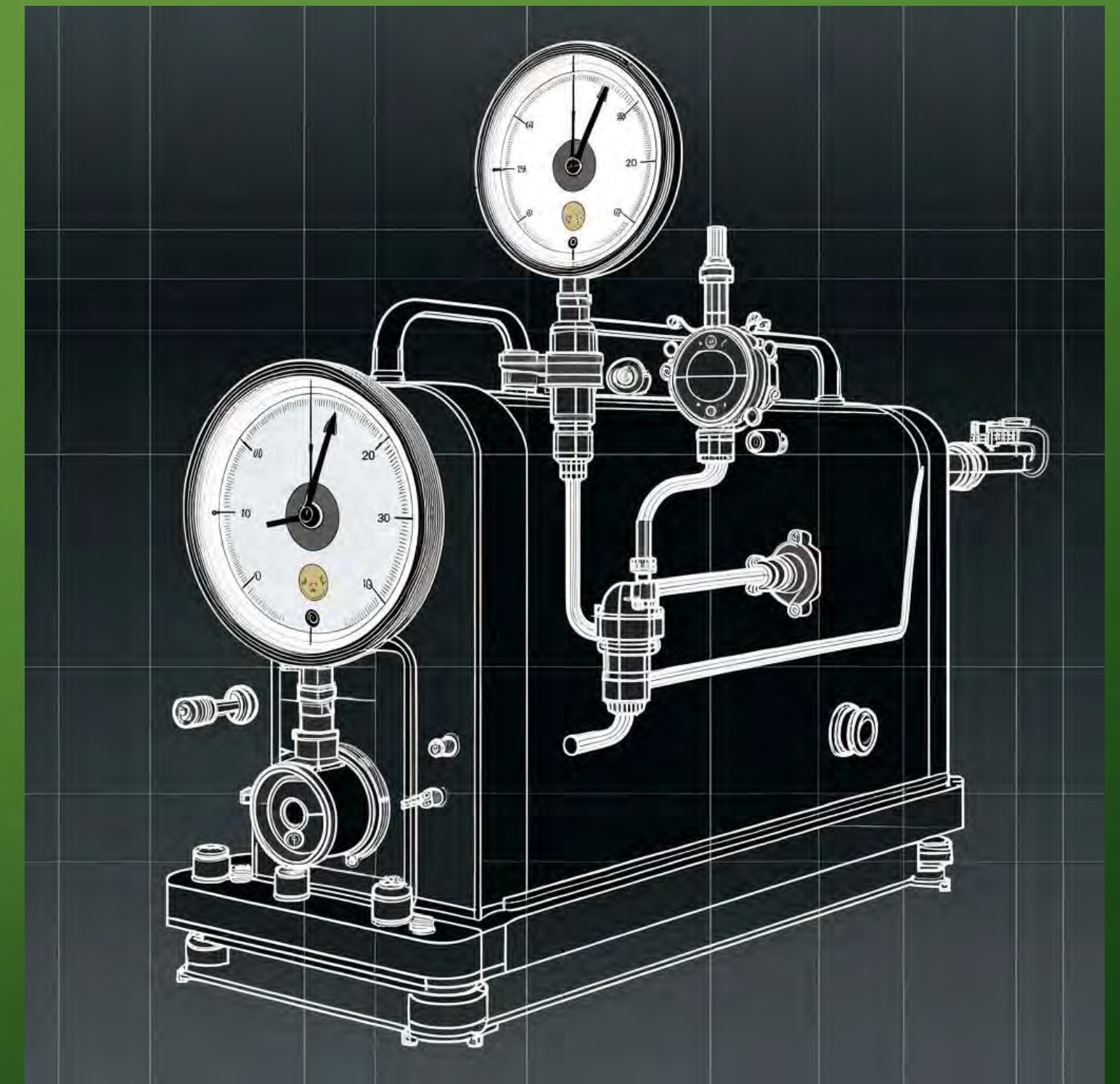
Digital transformation of physical processes



Sensor Data over network  
e.g. Private 5G

Control Data over network  
e.g. Private 5G

Augmented Reality(AR) worker  
assistance



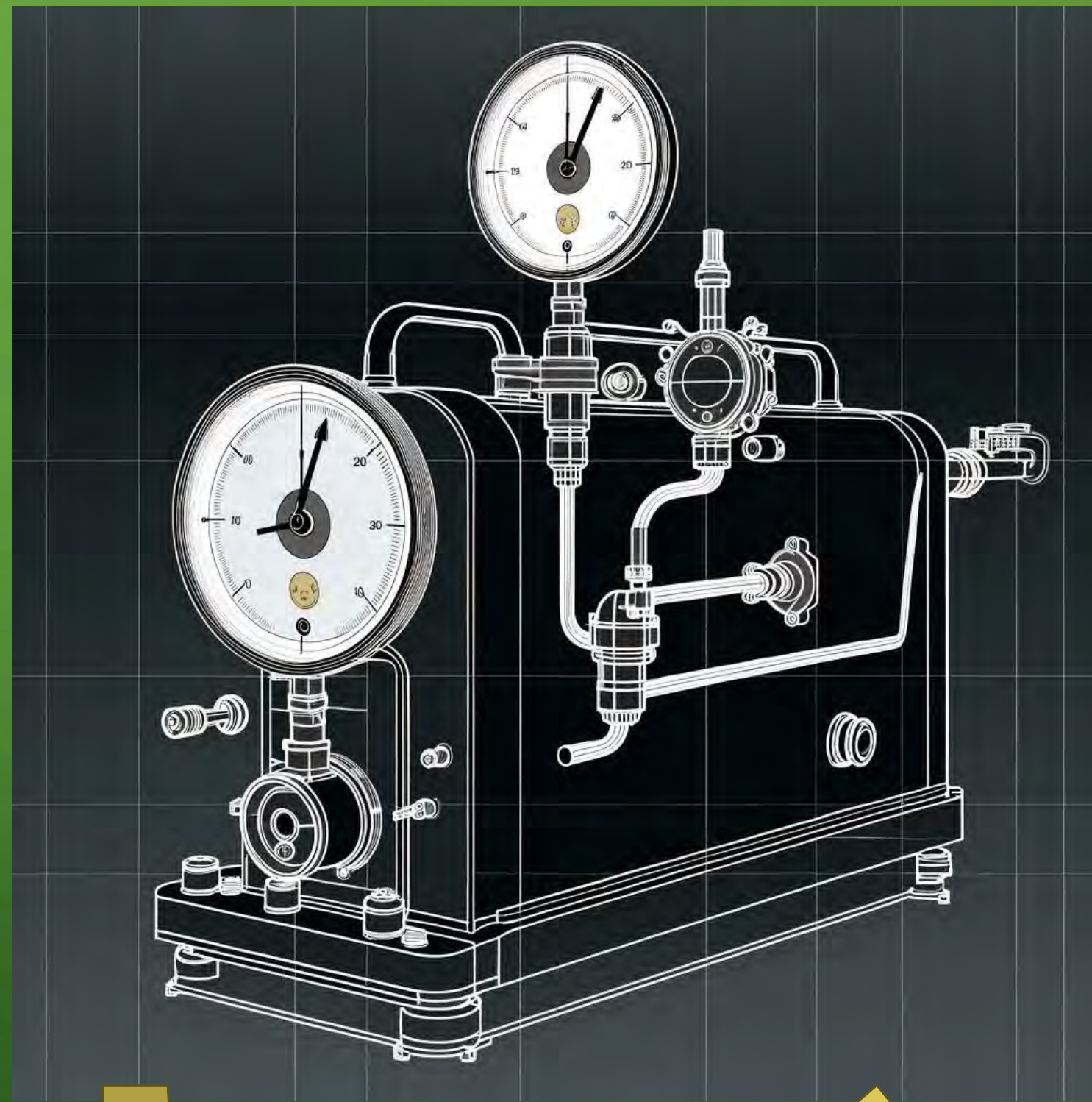
Edge computing & Machine Learning ML ...

... Cloud – AI Predictive Maintenance

The basis of the next/current industrial wave – Industry 4.0 (Used to just be “Industrie 4.0” but has become worldwide not just German government initiative)



# OTHER WAY AROUND TOO - DIGITAL THREAD – INDUSTRIAL METAVERSE

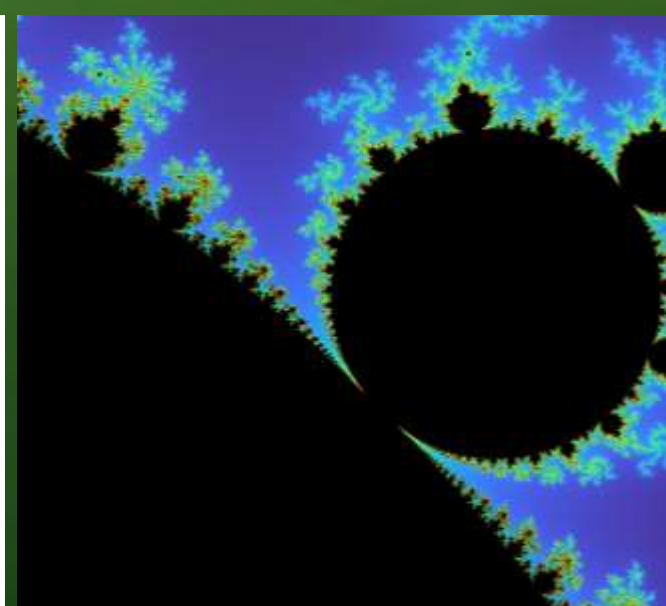
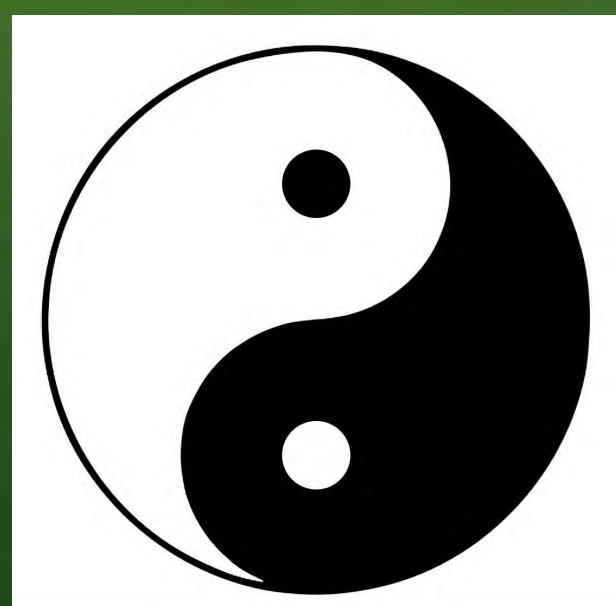


Digital design and simulation  
Before physical build and  
operation or What if  
scenarios

3D printing of parts, autonomous  
assembly etc.



Autonomous Robot training  
VR staff training





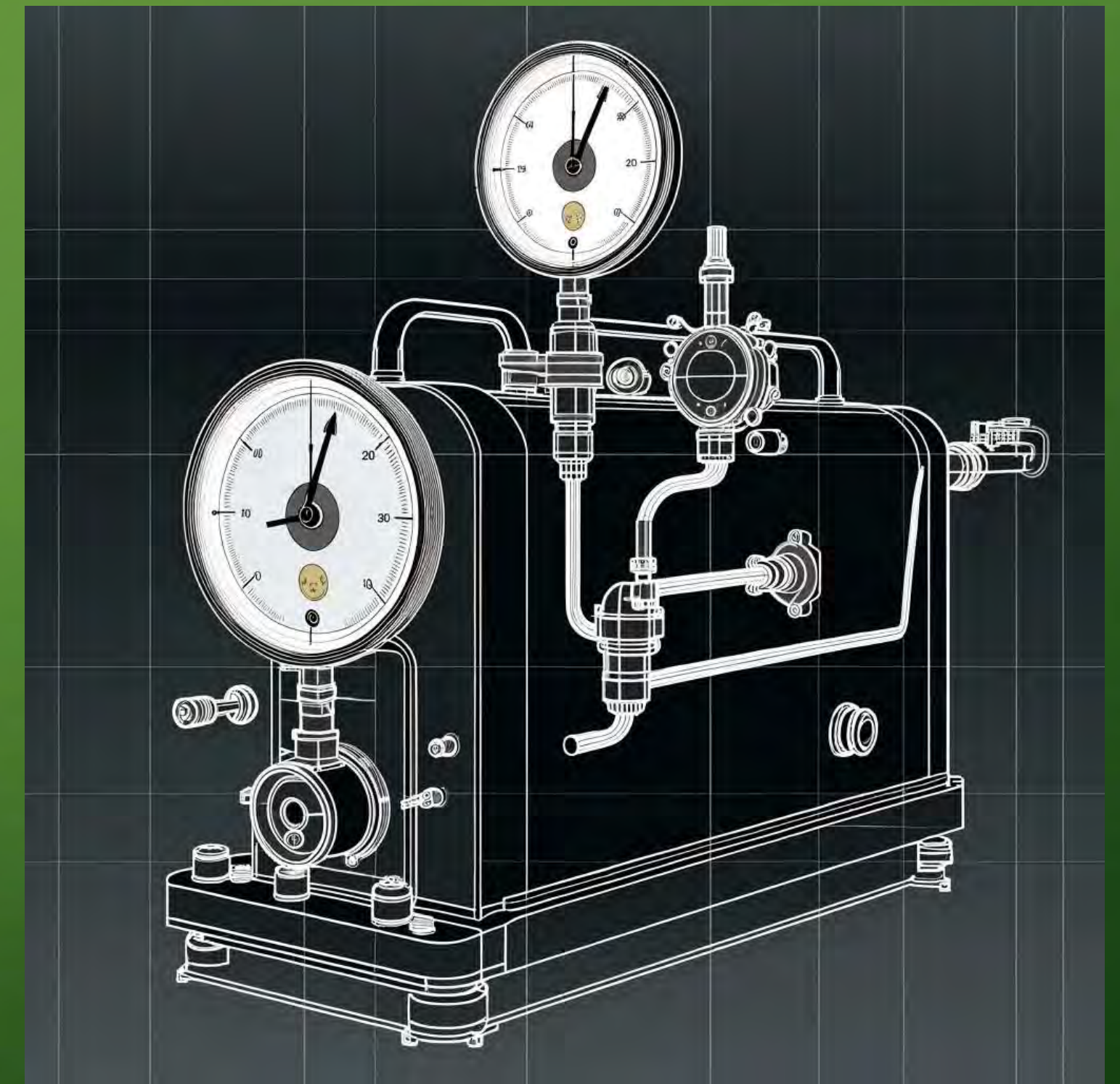
# BACK TO OPERATIONAL DIGITAL TWIN



Sensor Data over network  
e.g. Private 5G

Control Data over network  
e.g. Private 5G

Augmented Reality(AR) worker  
assistance



Edge computing & Machine Learning ML ...

... Cloud – AI Predictive Maintenance



# AI – ARTIFICIAL INTELLIGENCE – ALL THE RAGE

## Machine Learning(ML)

Ways to model and reason from data

Some structured

Some unstructured

## Large Language Model(LLM)

Model trained to deal with language and respond with “answers”

e.g. Predict the next word needed to be delivered

## Generative AI (GenAI)

Applications using LLMs and models to create many types of content

Text/search - ChatGPT/CoPilot

Images - MidJourney, Dall-E

Video - Runway.ml, Sora

3D Content happening too (metaverse)

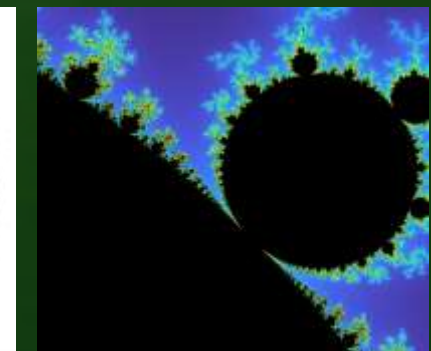
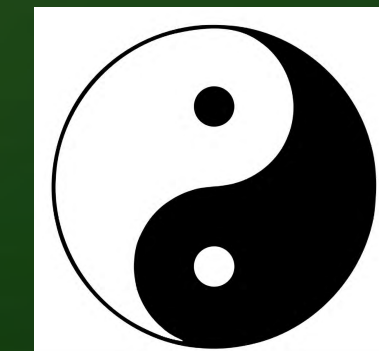
Less this



More this



Generative Adversarial Networks (GAN) are effectively a “head to head” training of what might be right and random wrong, iterates until model can tell good answer from bad random one.





# AI – ARTIFICIAL INTELLIGENCE – COMPOUND TERMS

Robotic process automation (RPA) AI to link other applications and processes (not a physical robot) e.g. in enterprise systems

Autonomous Guided Vehicle (AGV) AI in a physical robot – self driving car etc. Also AMR (Autonomous Mobile Robot), UAV (Unmanned Aerial Vehicle. Drones), Cobot (Collaborative Robot)

Non Player Character (NPC) – in game characters, used to be scripted now are being imbued with GenAI

**Artificial General Intelligence (AGI)** – Concept of an AI that actually thinks, rather than just appears to

A long way off ?





# CYBERNETICS

The combination of our physical selves and technology such as robotics and AI. (\$6 million dollar man)

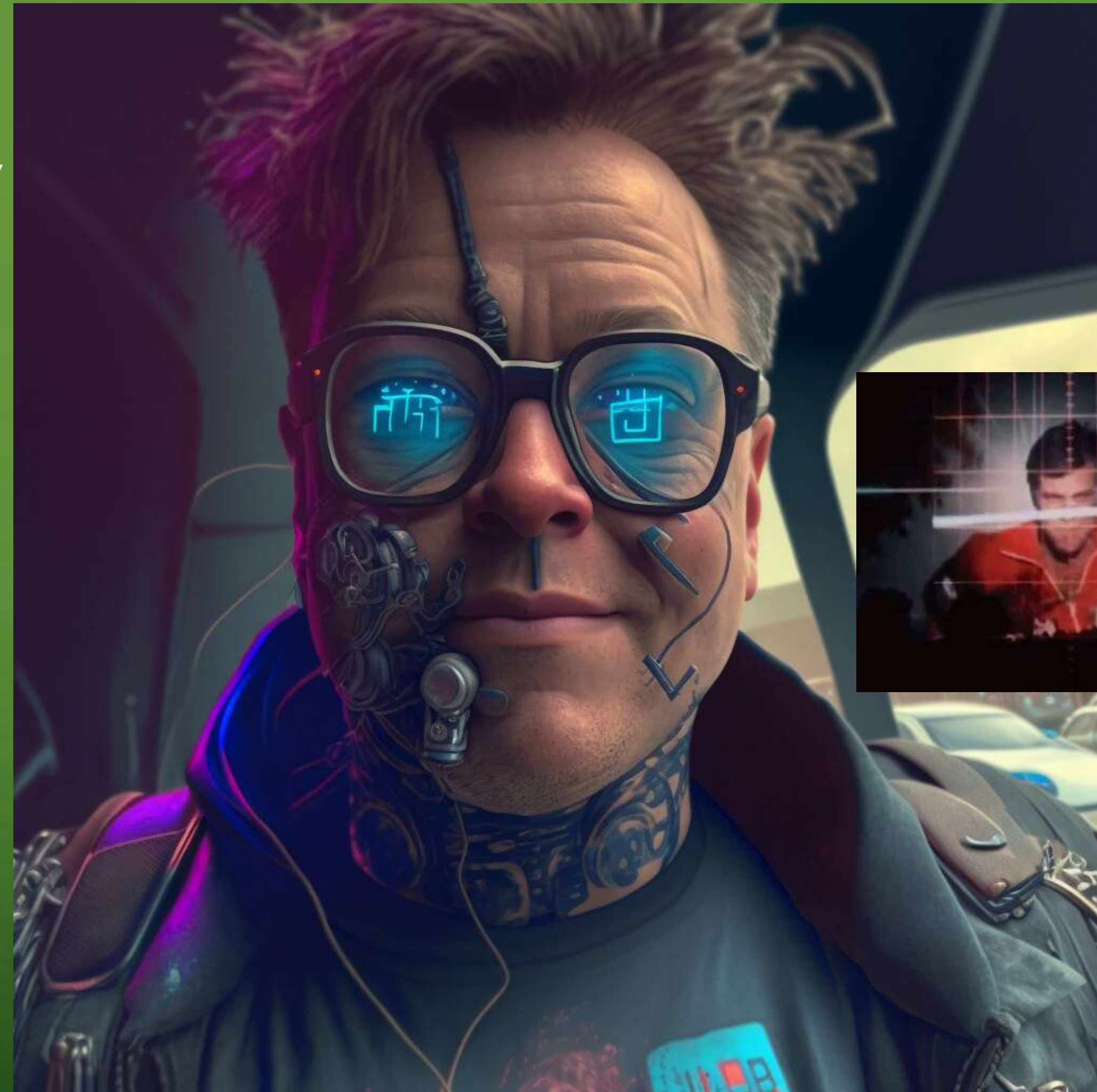
Often dystopian cyberpunk themes in sci-fi

Includes medical robotics prosthetics enhanced with AI and Brain Computer Interfaces(BCI).

Some BCI are invasive (Neuralink) others are “headset” sensors

Body hacker movement already people adding basic technology into their body

Some biohackers engaged in home brew gene editing  
Such as CRISPR-Cas9 (Clustered Regularly Interspaced Short Palindromic Repeats)





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SHOP ALL GENETIC ENGINEERING SCIENCE KITS & CLASSES LIVING THINGS HUMAN CELL CULTURE EQUIPMENT RESEARCH FOR HIRE ART CONSULTING

Shop By Price

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Home / Genetic Engineering

Genetic Engineering

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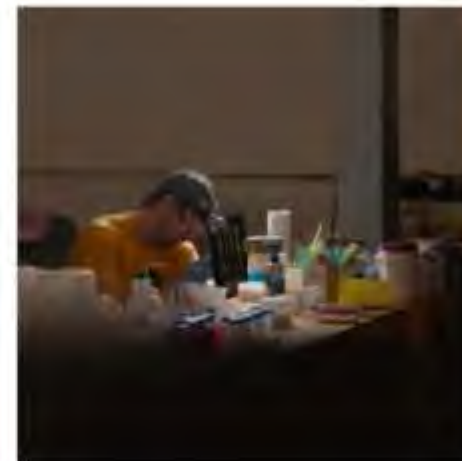
1 2 Next >



Plant Genetic Engineering Kit

\$99.00 - \$185.00

Compare  
★★★★★



Bioengineering 101 Beginner Kit and Video Lectures - No Experience Needed

\$199.99 - \$349.00

Compare  
★★★★★



Genetic Engineering Home Lab Kit

\$2,299.00 - \$3,244.00

Compare  
★★★★★



Genetic Design Starter Kit - Glowing Jellyfish Bacteria

\$39.99



Bioengineering 101 and Human Tissue Engineering 201 Combo Kit & Classes

\$574.00 - \$799.00



Pre-recorded - Human Tissue Culture and Engineering 201 - Kit & Class

\$400.00 - \$650.00

- Websites to buy gene editing kits
- <https://www.the-odin.com/>
- Not an endorsement – Shown as an example



# CRYPTO(CURRENCY) AND BLOCKCHAIN

## **Blockchain – A distributed ledger**

No central point of control, or failure

A “guaranteed” description of provenance under control of the whole network

## **Bitcoin – A cryptocurrency (one of many)**

Value is derived from unique values derived from a mathematical function

Crypto mining is the use of compute power to solve the unique values (which is a cost)

Once found an element of any crypto currency is placed on Blockchain to give ownership and uniqueness

Traded on a digital stock exchange

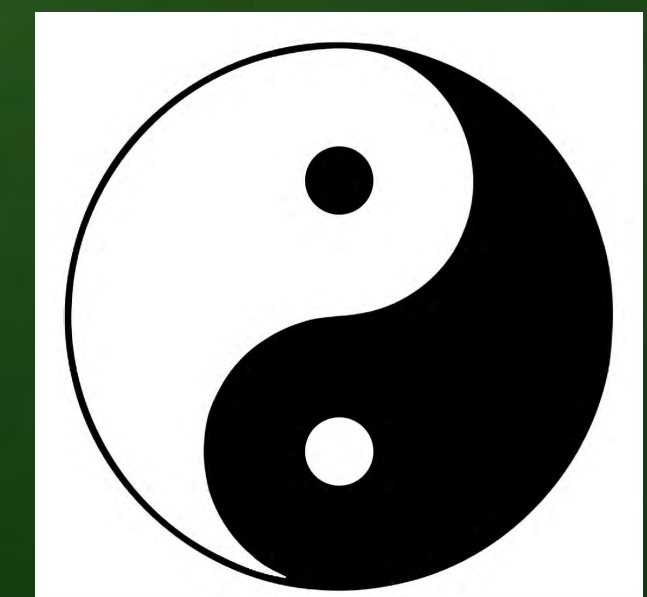
## **NFT – Non-Fungible Token**

Typically, a unique or personally owned digital artefact (or physical artefact with a digital receipt)

Traded on a digital stock exchange

Known for some big scams – FTX exchange, NFT grifting, digital wallet hacking/phishing, theft and pyramid schemes.

Use will settle to be more essential and normal over time.





# COMBINATIONS

Fintech – Combination of many of these technologies e.g. AI, cloud computing and blockchain applied to financial services and markets

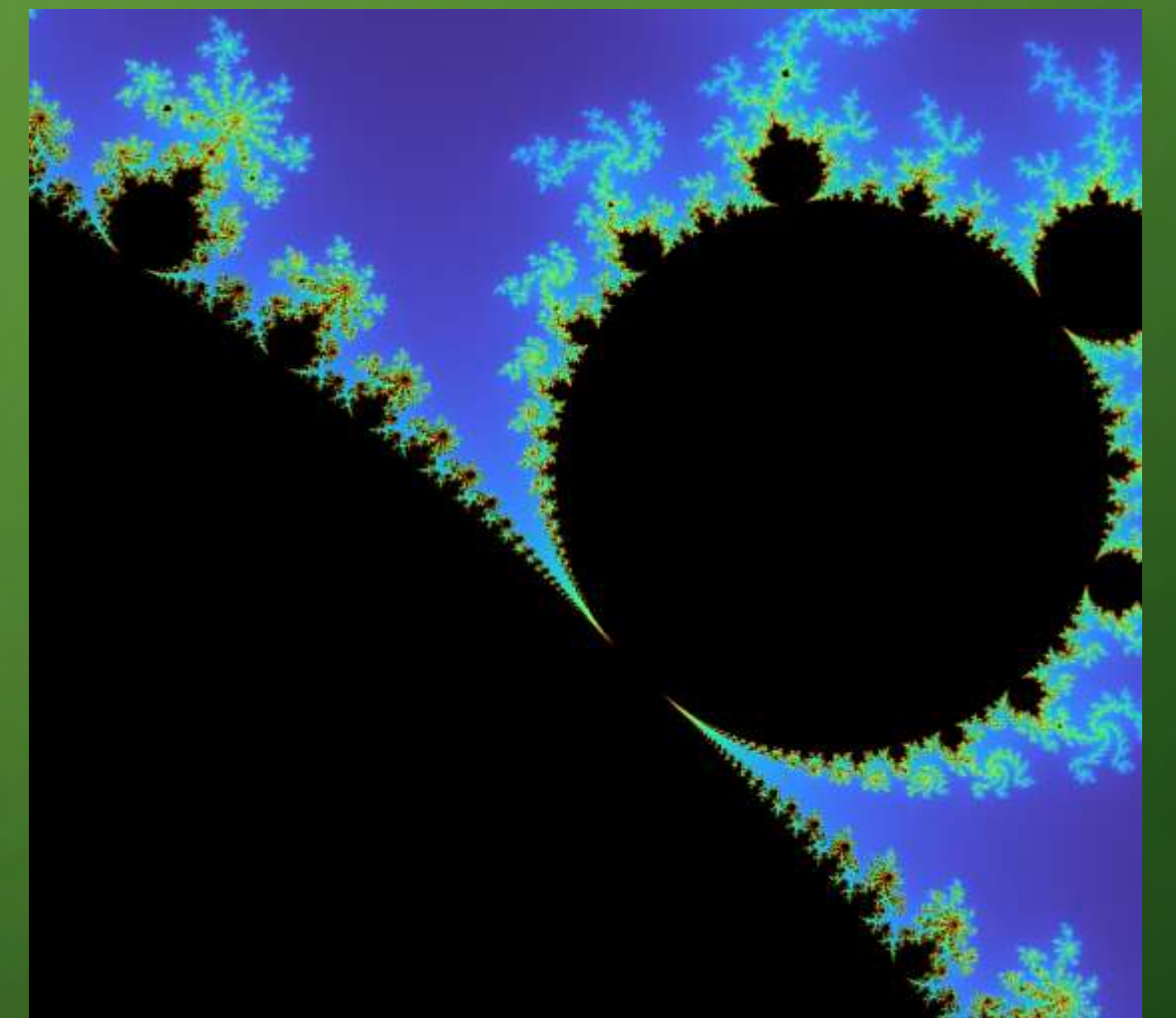
AgriTech - Combination of many of these technologies applied to agriculture

EduTech, BioTech, MarTech, SpaceTech etc....

Industry 4.0/5.0/6.0 - Combination of many of these technologies applied to industrial production

Each will layer on its own buzzwords and acronyms, but all similar at this level of abstraction

Aim is to do each of these things better with added digital





# WIDER CONCEPTS

**Open Source** – A community approach to almost anything, empowered by sharing and contributing to the whole.

It is confused with “Free” but the idea is that if you use something you help keeping it working

In tech, businesses will open source their product design to help create competition, services and an ecosystem

**Web3** – A conceptually open approach to the internet/web/metaverse where ownership is more aligned to open source concepts and a ownership of data is individual

It has technology associated with it but it is also an ideology or way of thinking – Closely entwined with cryptocurrency and NFT





**Sounds very familiar, doesn't it?**

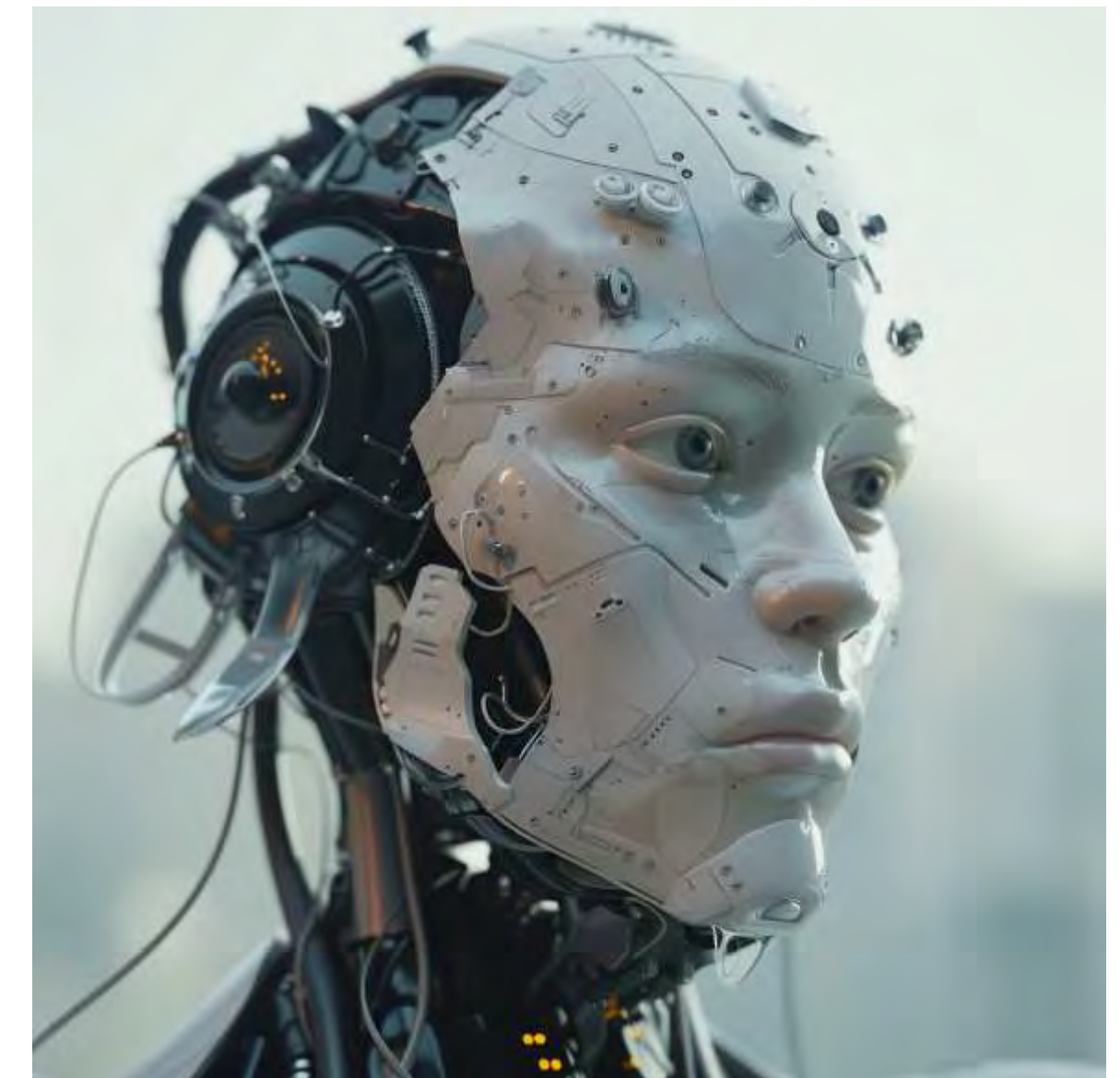
**Despite all the technical wizardry and fancy words**

**It's not the tech we have to worry about it's us**

# APPLYING THE WHOLE LOT

- AI may enhance what we can achieve
- Using AI may put us all out of a job
- IoT and industrial metaverse improves efficiency
- More things may end up being produced in pursuit of wealth
- Compute power, such as Quantum can make data more secure
- Quantum can be applied to crack other data
- Metaverse removes physical boundaries to communication and understanding
- It may become too good, and we lose ourselves to it
- **In the end – it is down to us as a global community to make it all work for the best.**

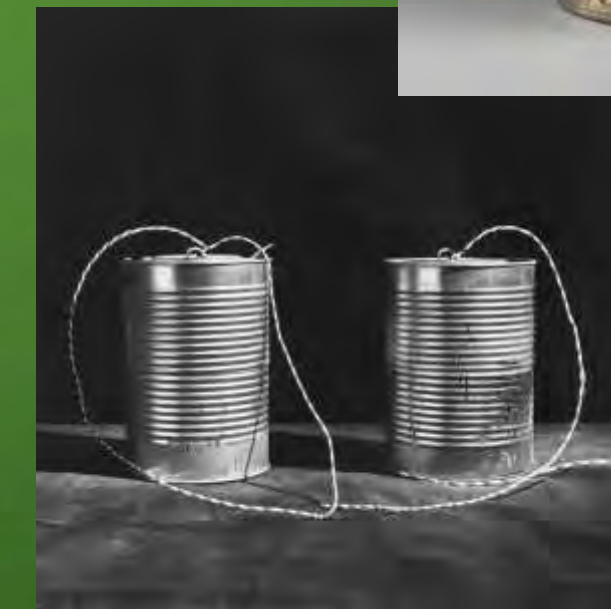
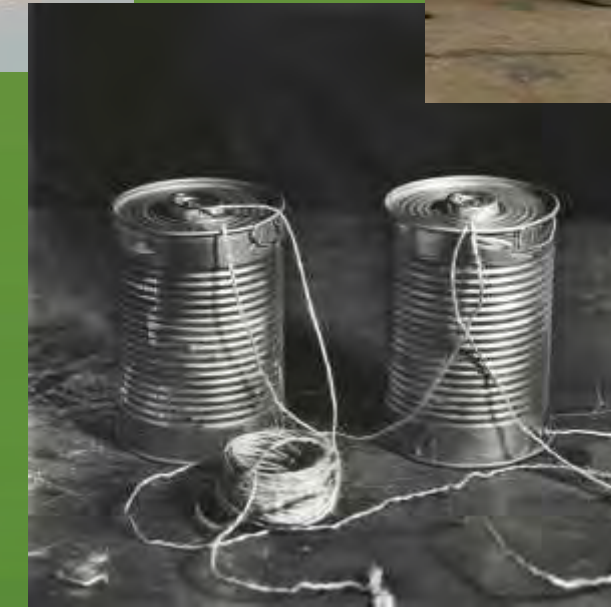
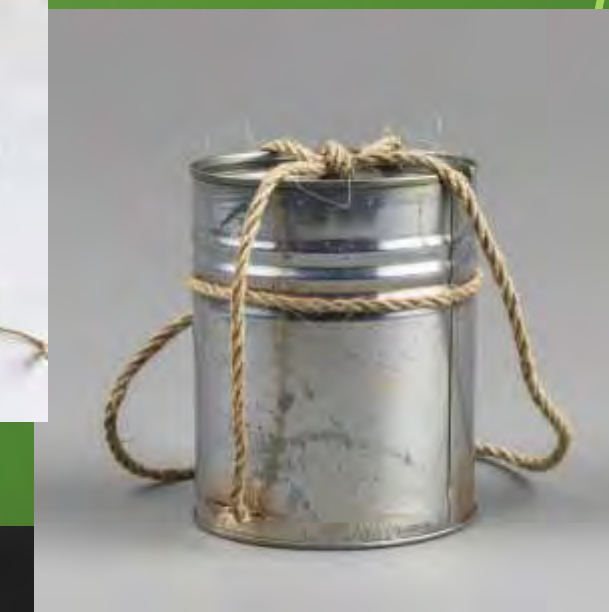
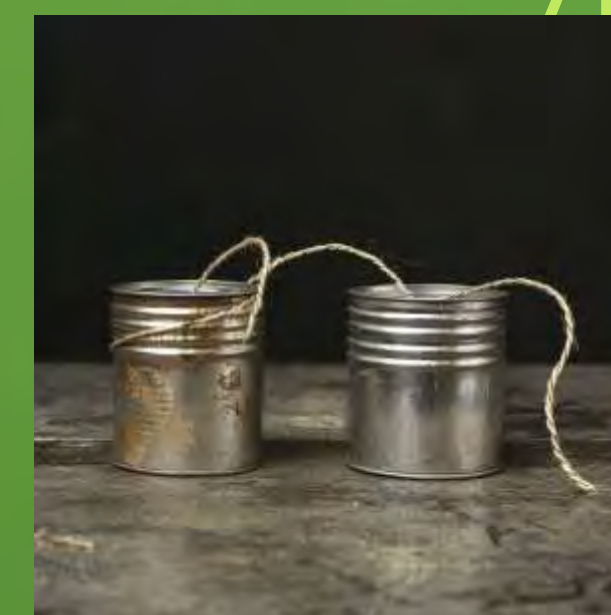




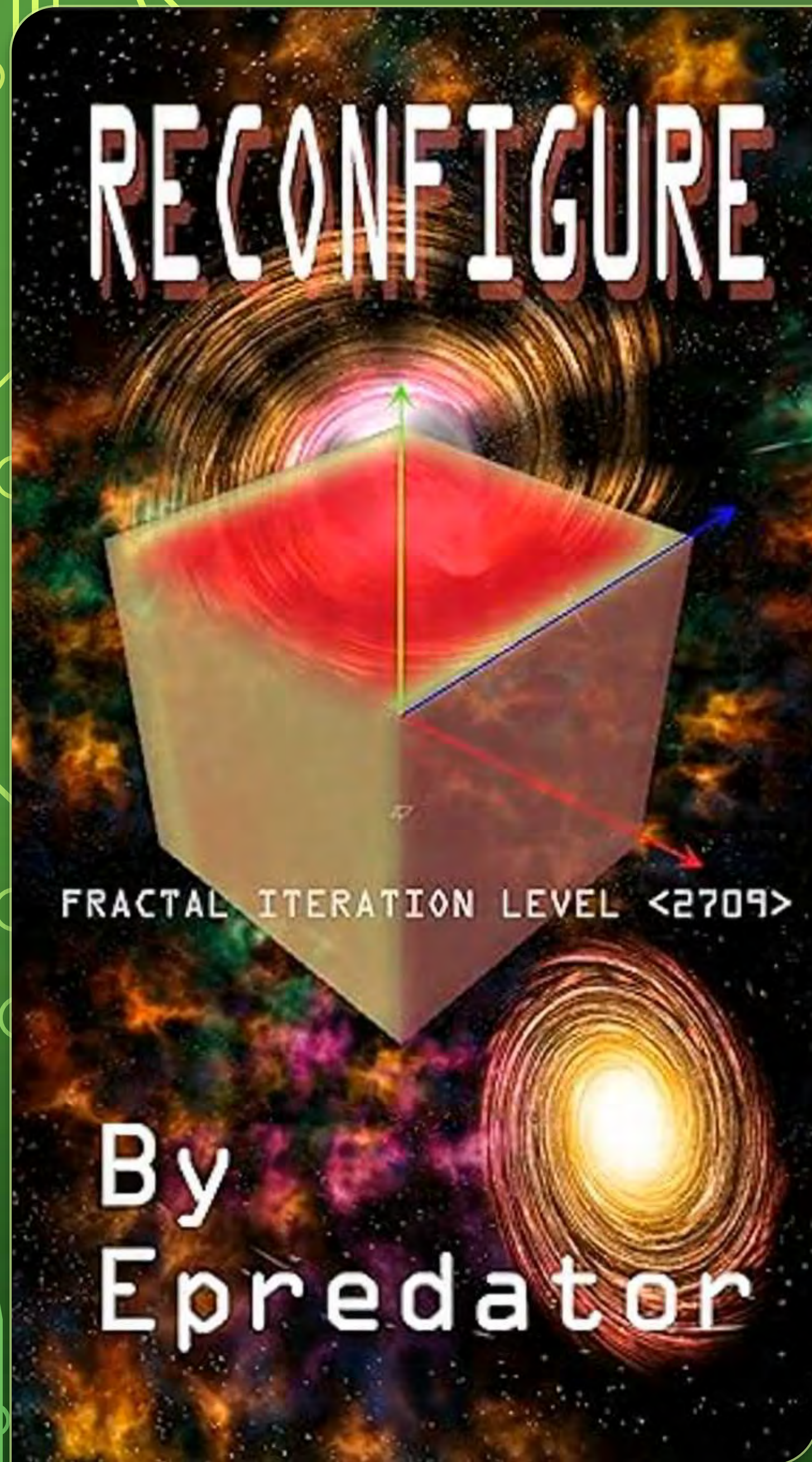
AND FINALLY  
ALL THE AI HAVE A WAY TO GO YET



# AI FAIL OUTTAKES







# THOUGH.... STILL LOOKING TO MAKE A RECONFIGURE MOVIE

WITH SOME AI ASSISTANCE AND TOOLING

IN THE OPENING SCENE ROISIN IS TRYING TO ESCAPE, GO OFF GRID BUT HAS ONE LAST THING TO DO AS THOSE LOOKING FOR HER CLOSE IN.

MIDJOURNEY AND LUMA.AI





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IAN HUGHES / @EPREDATOR

DOCTOR OF TECHNOLOGY(HONS)

[EPREDATOR@FEEDINGEDGE.CO.UK](mailto:EPREDATOR@FEEDINGEDGE.CO.UK)

BCS ANIMATION AND GAMES