

THE GEOSPATIAL ECOSYSTEM IN 2030

BRUCE McCORMACK

EUROGI Vice President

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HEALTH WARNING

RATE OF TECHNOLOGICAL CHANGE WHICH CAN IMPACT ON GEOSPATIAL IS VERY FAST ... AND LIKELY TO GET EVEN FASTER

Which Makes

PROBING WHAT CONDITIONS MIGHT BE LIKE IN 5 YEARS TIME IS **PROBLEMATIC**

But

IN A RAPIDLY CHANGING ENVIRONMENT WE NEED TO BE AS PREPARED AS POSSIBLE FOR WHAT IS COMING DOWN THE TRACK

So

IT IS **WORTH A TRY** ... TO ENVISION A FUTURE CONTEXT FOR GEOSPATIAL IN 2030



OUTLINE OF THE PRESENTATION

- (SOME) KEY TECHNOLOGY TRENDS
 - COMPUTERS
 - REMOTE SENSING
 - DIGITAL TWINS
 - ROBOTICS
 - COMMUNICATIONS
 - **AI**
- **THE POSSIBLE GEOSPATIA ENVIRONMENT IN 2030**
- **GETTING PERSONAL**
- ***CHAT***

Will race through these



COMPUTERS

Likely/possible advances towards 2030

MEMORY

- NEUROMORPHIC
- OPTICAL
- GRAPHINE
- **DNA**
- QUANTUM

COMPUTING

- QUANTUM/SILICON INTEGRATION
- AI DRIVEN PROCESSORS
- NEUROMORPHIC
- ANGSTROM SIZE TRANSISTORS
- PHOTONIC

MEMORY & COMPUTING IN ONE

AT LEAST 10 RESEARCH INSTITUTES AROUND THE WORLD ARE INVESTIGATING HOW TO CREATE COMPUTERS BASED ON **MEMRISTORS** (MEMORY RESISTORS) WHICH MIMIC THE WAY THE BRAIN'S NEURONS AND SYNAPSES WORK ... SOME MEMRISTORS MADE FROM SALT AND WATER



REMOTE SENSING

Likely/possible advances towards 2030

- **HIGHER RESOLUTION** .. 10cm x 10cm optical
 - MULTI-SPECTRAL
 - AI POWERED DATA ANALYTICS
 - HYPERSPECTRAL
- SPACE AND GROUND BASED (eg IoT) SENSOR INFORMATION INTEGRATION
 - CONSTELLATIONS OF SMALL SATELLITES OFFERING **NEAR REAL-TIME**
 - DATA SUPPLY VIRTUALLY EVERYWHERE
 - DRONES
 - HIGH END AERIAL PHOTOGRAPHY RESOLUTION LEVELS .. 3 – 5cm



DIGITAL TWINS

Likely/possible advances towards 2030

- MORE AND MORE DTs AT HIGHER LEVELS ON THE **LOD SCALE**
 - INCORPORATION OF AI
 - EXPANSION INTO NEW SECTORS
 - **EDGE COMPUTING** AND REAL-TIME
- FUSION WITH EXTENDED REALITY (AR AND VR)
 - DT as a SERVICE (DTaaS)
- 5G CONNECTIVITY MORE PREVALENT ... 6G COMING



ROBOTICS

Likely/possible advances towards 2030

- BECOMING **MORE HUMANOID** ... looks and functions
 - **AI ENABLED**
- BETTER COLLABORATION WITH HUMANS & EACH OTHER
 - SOFT ROBOTS
 - DELICACY OF TOUCH
 - AUTONOMY
 - LIFTING HEAVIER WEIGHTS
 - MORE AGILE
- AI WILL PROVIDE MORE ADVANCED CAPABILITIES

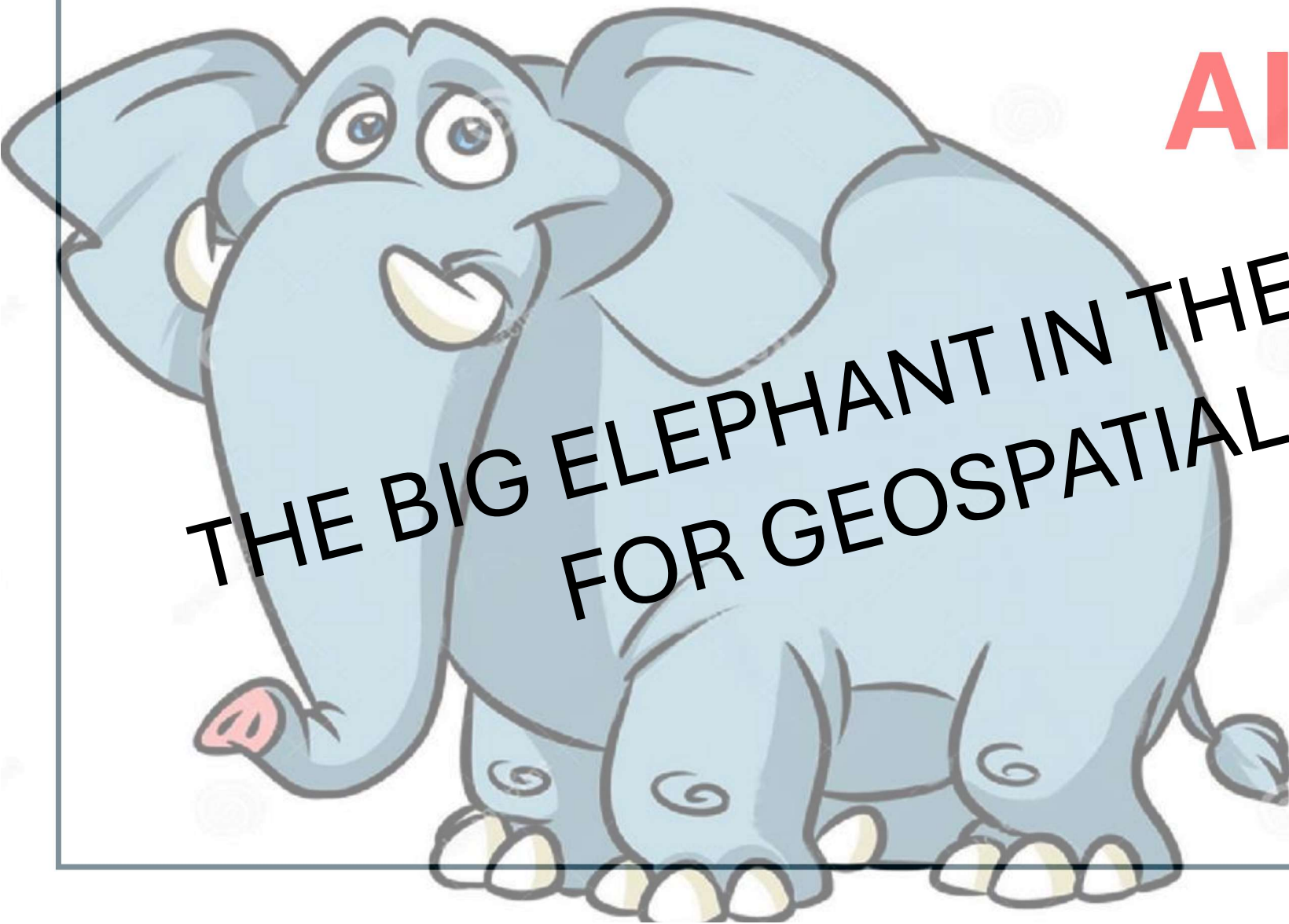


COMMUNICATIONS

Likely/possible advances towards 2030

- 6G NETWORKS
- QUANTUM COMMUNICATIONS NETWORKS
- SATELLITE INTERNET EXPANSION
- AI DRIVEN NETWORK OPTIMISATION
- **HOLOGRAPHIC TELEPRESENCE** ... 3D virtual meetings revolutionising remote working and collaboration in healthcare, education, entertainment
- BETTER ENERGY EFFICIENCY





AI

THE BIG ELEPHANT IN THE ROOM
FOR GEOSPATIAL

THE FUNDAMENTAL AIM OF AI DEVELOPMENT IS TO REPRODUCE THE ABILITIES OF THE HUMAN BRAIN

THIS IS A TRULY **REVOLUTIONARY ENDEAVOUR** WITH
PROFOUND, RADICAL CONSEQUENCES FOR HUMANITY AND
THE REST OF THE WORLD



WHY THE BIG ELEPHANT FOR GEOSPATIAL

FUNDAMENTALLY ... BECAUSE MANY GEOSPATIAL TASKS
ARE **CAPABLE OF AUTOMATION** ... from simple to more complicated

HOW

- AI AGENTS
 - DRAG AND DROP, NO CODE SERVICES
 - POWERFUL GeoAIs



AI AGENTS ... KEY FEATURES

- 'REASONING'
 - CREATE A PLAN TO ACHIEVE A GOAL
- **ACT AUTONOMOUSLY** ... do things, take concrete actions
 - ADAPTABILITY ... POTENTIAL SCARY STUFF HERE
 - CONTEXT AWARENESS
 - COLLABORATION BETWEEN AGENTS
 - SELF IMPROVEMENT
 - **SWARMS**
 - MULTIMODAL PROCESSING



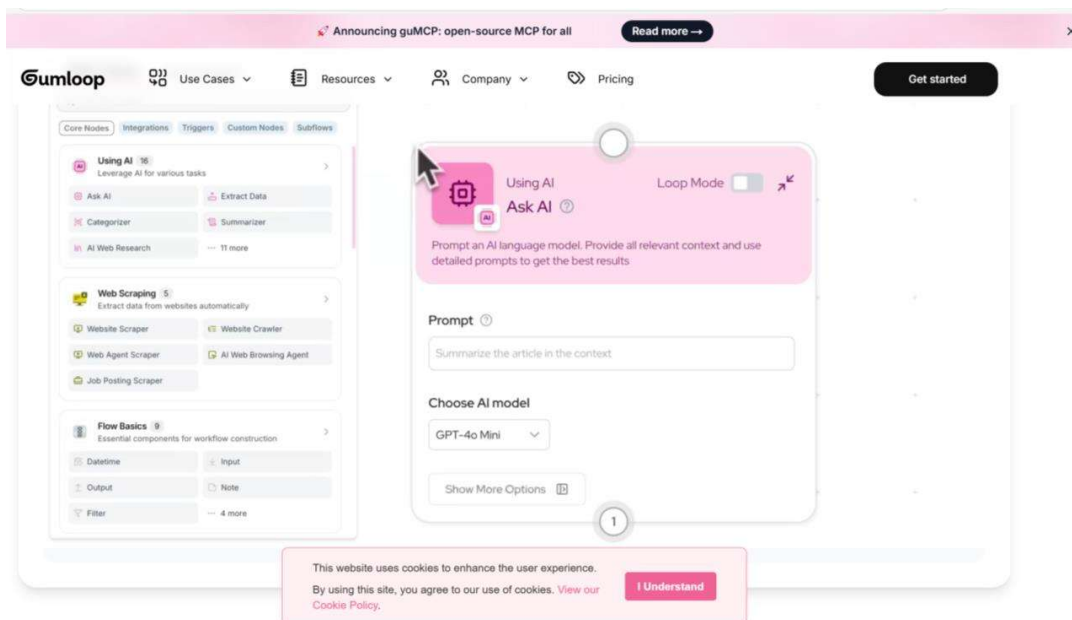
OpenAI's STAGE 5 OF AI DEVELOPMENT (AGI)

Where for example

*“AI systems are envisioned to operate at the **scale of entire organizations**. These AI systems would be capable of **handling complex workflows**, making **strategic decisions**, and **optimizing operations** across various domains. Essentially, they would function as **self-sufficient entities**, **managing** and **executing** a **wide range of tasks that typically require human intervention**.”*

THIS SITUATION IS LIKELY COMING ... issue is WHEN
So-called **AI Agents** would probably be the primary AI driver

DRAG & DROP, NO CODE ... KEY FEATURES



- **WORKFLOW AUTOMATION**
 - VISUAL INTERFACE
- **PREBUILT COMPONENTS**
 - REAL-TIME PREVIEW
 - DATA INTEGRATION
- **USER ACCESS MANAGEMENT**
 - SCALIBILITY
- **COST-EFFECTIVENESS**



POWERFUL GeoAIs

GENERAL TRAINING DATA

- TEXTUAL DATA
- CODING LANGUAGES
- MULTILINGUAL DATA
- CONVERSATIONAL DATA
- LEGISLATION
- ETHICAL RULES/GUIDELINES
- ETC

GEOSPATIAL TRAINING DATA

- IMAGERY OF MANY TYPES
 - TOPOGRAPHIC DATA
- OPEN SOURCE GIS PACKAGES
 - TIME SERIES GEO DATA
- GEO REFERENCED DEMOGRAPHIC/ENV. DATA
 - UNIVERSITY LECTURE NOTES
- ETC

INPUTS

- VOICE
- VIDEO
- IMAGERY
- STATISTICS
- TEXT
- MIXED INPUTS



TYPES OF AI ... billions of nodes

- LLM
- GENERTIVE
- MACHINE LEARNING
- GEO ANALYTICS
- DEEP LEARNING MODELS
- TIME SERIES MODELS
- MATHEMATICAL FOCUSED



OUTPUTS

- MAPS
- STATISTICS
- VIDEO
- SLIDE PRESENTATION
- REPORTS
- VIDEO
- MIXED OUTPUTS

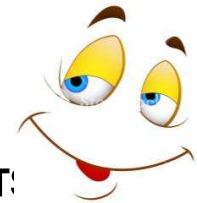




THE GEOSPATIAL ECOSYSTEM IN 2030

THANKS MAINLY TO **AI**
A TRANSFORMED GEOSPATIAL WORK
ENVIRONMENT COMING DOWN THE TRACK
ADAPT OR DIE

GEOSPATIAL ECOSYSTEM IN 2030 ... maybe



- FROM A DOING ACTUAL GEOSPATIAL WORK POINT OF VIEW ... **DOMINATED BY AI AGENTS**:
 - MANY MANY .. MAYBE 10's or 100's OF MILLIONS
 - AGENTS MANAGING AGENTS ... who manages the AI managing agents?
- **INSTITUTIONAL ECOSYSTEM**
 - MAJOR ROLE FOR NON-GEO COMPANIES ... data analytics / computer science based
 - TECHNICAL PROVIDERS
 - 'BIG BEASTS' ... providing foundation AI facilities requiring many billions of \$ to develop and maintain
 - GEO BIG COMPANIES ... providing general purpose GeoAI tools
 - SMEs ... focussing on niche markets to meet local mainly (but not exclusively) needs
 - THOUSANDS OF OVERLAPPING AI NETWORKS
 - REGULATORY AUTHORITIES STRUGGLING TO CATCH UP
 - EVOLVING RAPIDLY
- MILLIONS OF **NON-PROFESSIONAL CITIZENS & NGOs** DOING MORE AND MORE TRADITIONAL GIS PROFESSIONAL TASKS ... just talk to your laptop



GETTING PERSONAL

- AM INVOLVED WITH 2 GEOSPATIAL COMPANIES ... 13 staff
- WE ARE FEELING THE **FIRST BREATHS OF SHIFT TO AI** ... worried about future income flow for businesses
- OUR RESPONSE
 - **DEVELOP A STRATEGY** Urgently
 - BASIC OPTIONS
 - BECOME
 - AI COMPANIES WITH GEO EXPERTISE ... big manshift needed
 - GET BOUGHT OUT BY AN AI/DATA ANALYTICS COMPANY
 - BROAD COMPONENTS TO TRANSFORM OURSELVES
 - GET FUNDS TO DEVELOP AI AGENTS ... likely to get funds to develop 3 AI Agents
 - READ READ READ ... Keep up to date re AI & other key technologies
 - EXPLORE AI AVENUES / TRY AI MODELS/AGENTS ... **test test test**
 - REVIEW STAFF WORK TYPES AND CAPABILITIES ... training programmes



STRATEGIC RESPONSES

WHAT SHOULD BE YOUR RESPONSE

FIGHT AGAINST

PASSIVE WAIT AND SEE

HEAD IN SAND

ACCEPT, DO JUST ENOUGH AND GO WITH THE FLOW

EMBRACE AND ACTIVELY TRY TO SHAPE YOUR ORGANISATION'S RESPONSE





GETTING PERSONAL



OUR GEOSPATIAL BUSINESSES ARE FEELING THE **FIRST 'BREATHS'** OF WHAT IS COMING BECAUSE OF AI

OUR STRATEGIC RESPONSE

WE HAVE TO RIDE THE AI WAVE ... SWIM IN IT

SHORT TERM STEPS

- GET FUNDING TO DEVELOP AI EQUIVALENTS OF MORE SOPHISTICATED GEOSPATIAL TYPES OF JOBS WE ALREADY DO
 - LINK UP WITH HIGH QUALITY DATABASE PROVIDERS
 - LINK UP WITH AI COMPANIES
 - READ READ READ TO KEEP UP TO DATE
 - ADOPT A FLEXIBLE, AGILE MINDSET





THE EMERGING FUTURE IS HERE ... NOW

discussion facilitated by

Bruce McCormack

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CHAT TIME

IMPLICATIONS FOR YOU & YOUR PLANNING ORGANISATION



AI

THE BIG DISRUPTOR

will turn our sector upsidedown



