

University of Missouri



WELCOME

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MU CIO

UM VP-IT



Cyberinfrastructure Day
2013



I'm from IT and I'm here to help you



Cyberinfrastructure Day
2013

Opportunities

- ◆ Archives of today's event will be permanently available in the UM digital archive, MOspace. Visit <http://mospace.umsystem.edu> and search for "CI Day"
- ◆ eduroam setups
- ◆ ORCID ID Creation
- ◆ CI Evaluation – *register for prizes from Tiger Tech*
 - ◆ \$50 gift certificate
 - ◆ Headphones
 - ◆ Wireless Printer



Research Opportunity

- ◆ You can choose (or not) to share your experiences and perceptions about using cyberinfrastructure in your research.
- ◆ A student research team from the School of Information Science and Learning Technologies Information Experience Lab are conducting a research study on Users Experience with Big Data.
- ◆ The research team will video-record the sessions for their use.
- ◆ A consent form is available with additional information about this study.



Thank You!

- ◆ Hank Foley
- ◆ Session Speakers
- ◆ MU CI Council Members
- ◆ MO EPSCoR CI Subcommittee
- ◆ DoIT Marketing – Jacquie Cummins and team
- ◆ MU News Bureau
- ◆ Sanda Erdelez & Students
- ◆ Jack Schultz for the use of the Bond Life Sciences Center
- ◆ Tiger Tech
- ◆ Mizzou Advantage
- ◆ Special Thanks to Diane Oerly, Mary Beth Pepper, and Cynthia Scheiner



Schedule

9:00 Keynote presentation – *Monsanto Auditorium*

10:00 CI Plan – *Monsanto Auditorium*

11:00 Break

10:45 Breakouts

Security/HIPAA

Storage/Archiving

11:30 Lunch

1:00 Tech Trends in 2013 – *Monsanto Auditorium*

2:00 – 3:30 Visualization – iLab Tour - *233 Stanley*



Schedule

2:00 Breakouts

Collaboration/Assistance

HPC/Networking

3:00 Breakouts

Security/Compliance

Digital Humanities

Genomics

4:00 Discussion and follow-ups





In the beginning was the Word.

Genesis 1:1



Cyberinfrastructure Day
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Cyberinfrastructure – “CI”

- ◆ Research environments supporting **data**...
 - ◆ ...acquisition
 - ◆ ...storage
 - ◆ ...management
 - ◆ ...integration
 - ◆ ...mining and
 - ◆ ...visualization



CI Components

- ◆ **Advanced computing systems**
- ◆ **Data storage systems**
- ◆ **Instruments**
- ◆ **Data repositories**
- ◆ **Visualization environments**
- ◆ **Linkage through software and networks**
- ◆ **People and their expertise**



CI

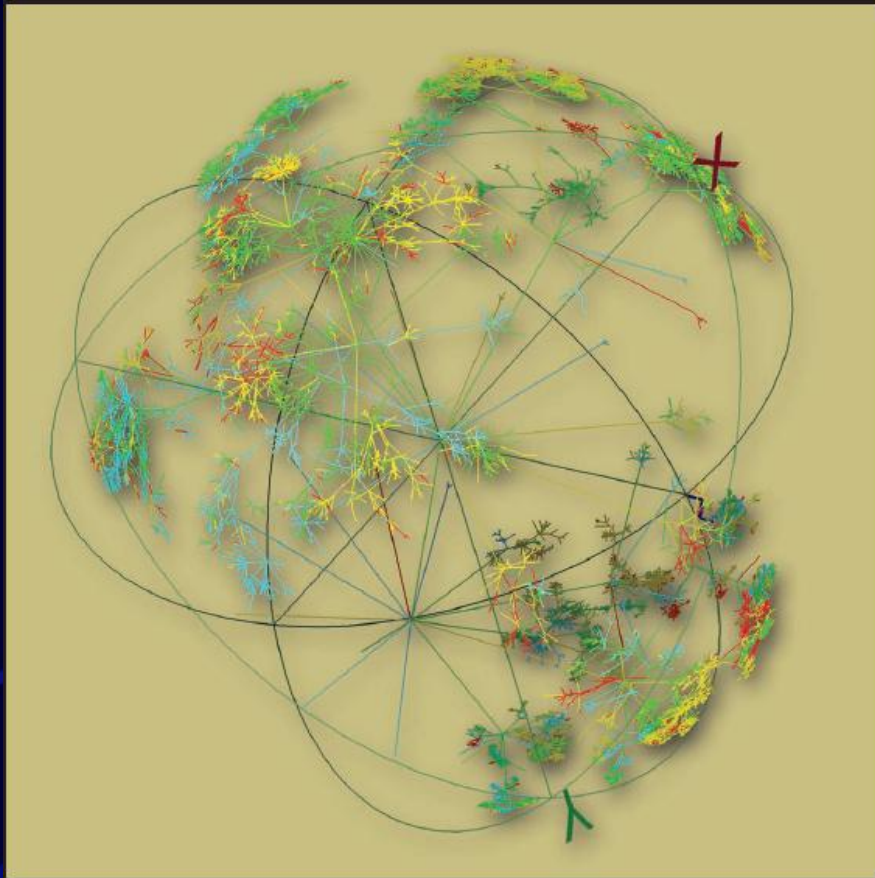
- ◆ Much, much more than simply computing and network connectivity
- ◆ Focused on sharing and making greater capabilities available across research communities
- ◆ Allows applications to interoperate across institutions and disciplines
- ◆ Ensures that data and software acquired at great expense are preserved and easily available to all
- ◆ ***RESULT: Improved research productivity and breakthroughs not otherwise possible***



The Premise

- ◆ **Data infrastructure and services (including visualization) are essential research assets fundamental to today's science and as long-term investment in national prosperity.**

CYBERINFRASTRUCTURE VISION FOR 21ST CENTURY DISCOVERY

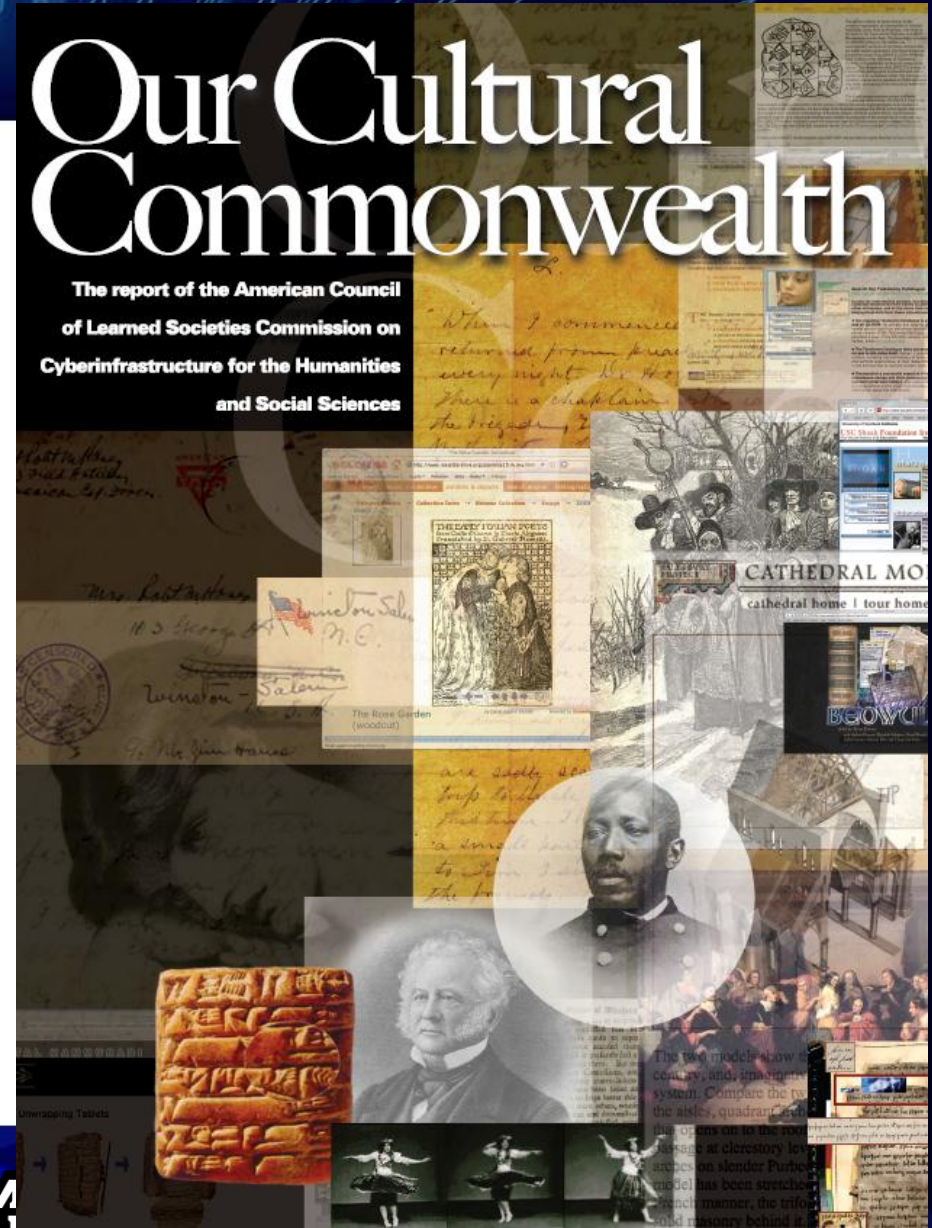


National Science Foundation
Cyberinfrastructure Council
March 2007



Our Cultural Commonwealth

The report of the American Council
of Learned Societies Commission on
Cyberinfrastructure for the Humanities
and Social Sciences



The Business Case

- ◆ Information technology dollars are not being spent efficiently on campus
- ◆ Slow pace of cultural change in academia is mismatched to pace of technological change
- ◆ Culture and budgeting processes prevent realization of scale-driven efficiencies
- ◆ IT cost drivers are hard to observe and measure by individual faculty

CI Council: Objectives – Phase 1

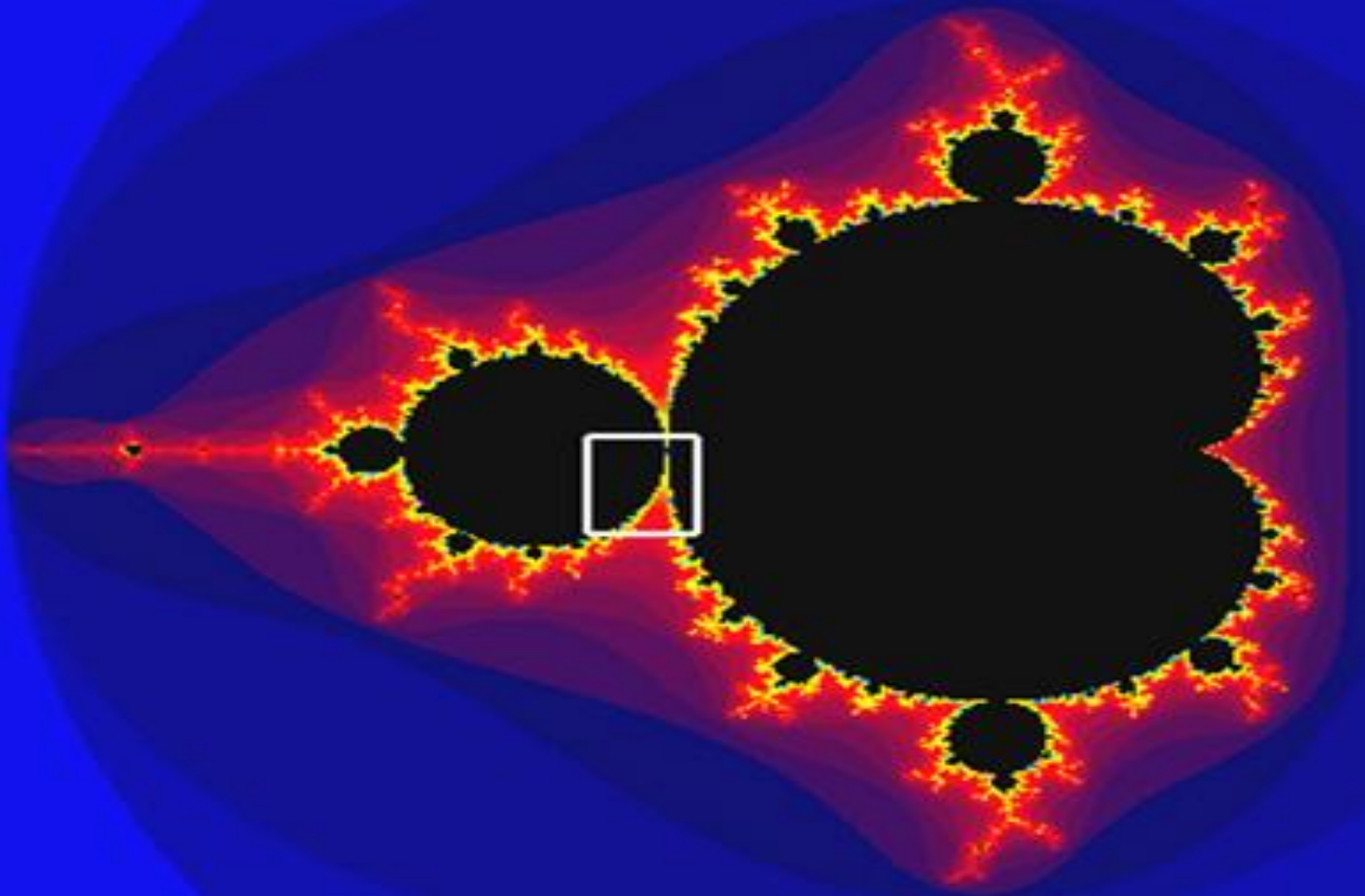
- ◆ Understand the CI necessary to support MU.
- ◆ Understand trends in research computing technologies.
- ◆ Address appropriate governance and funding models for research CI.
- ◆ Create an on-going CI Council to inform and direct resource allocation decisions.



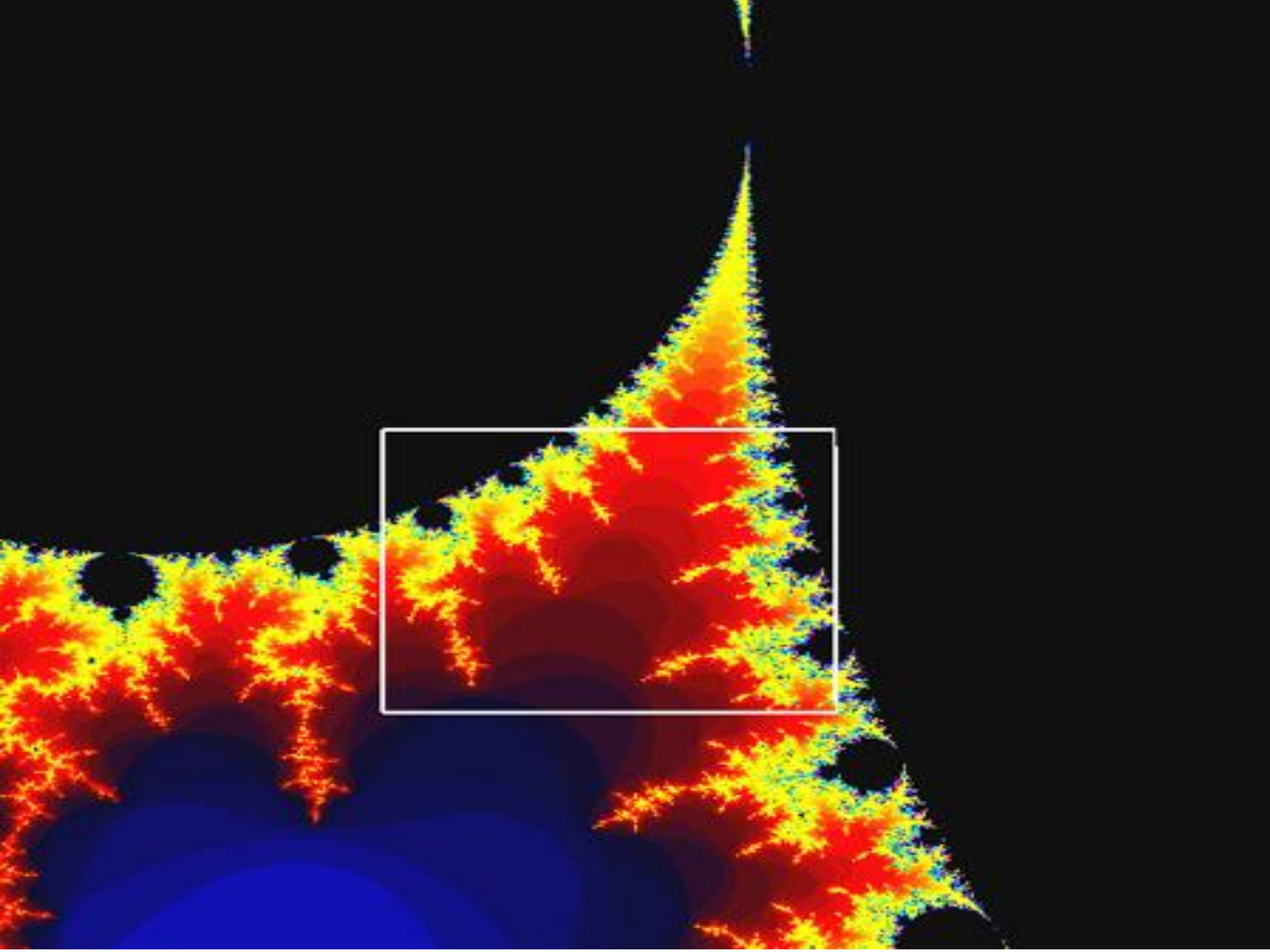
Chaos Theory

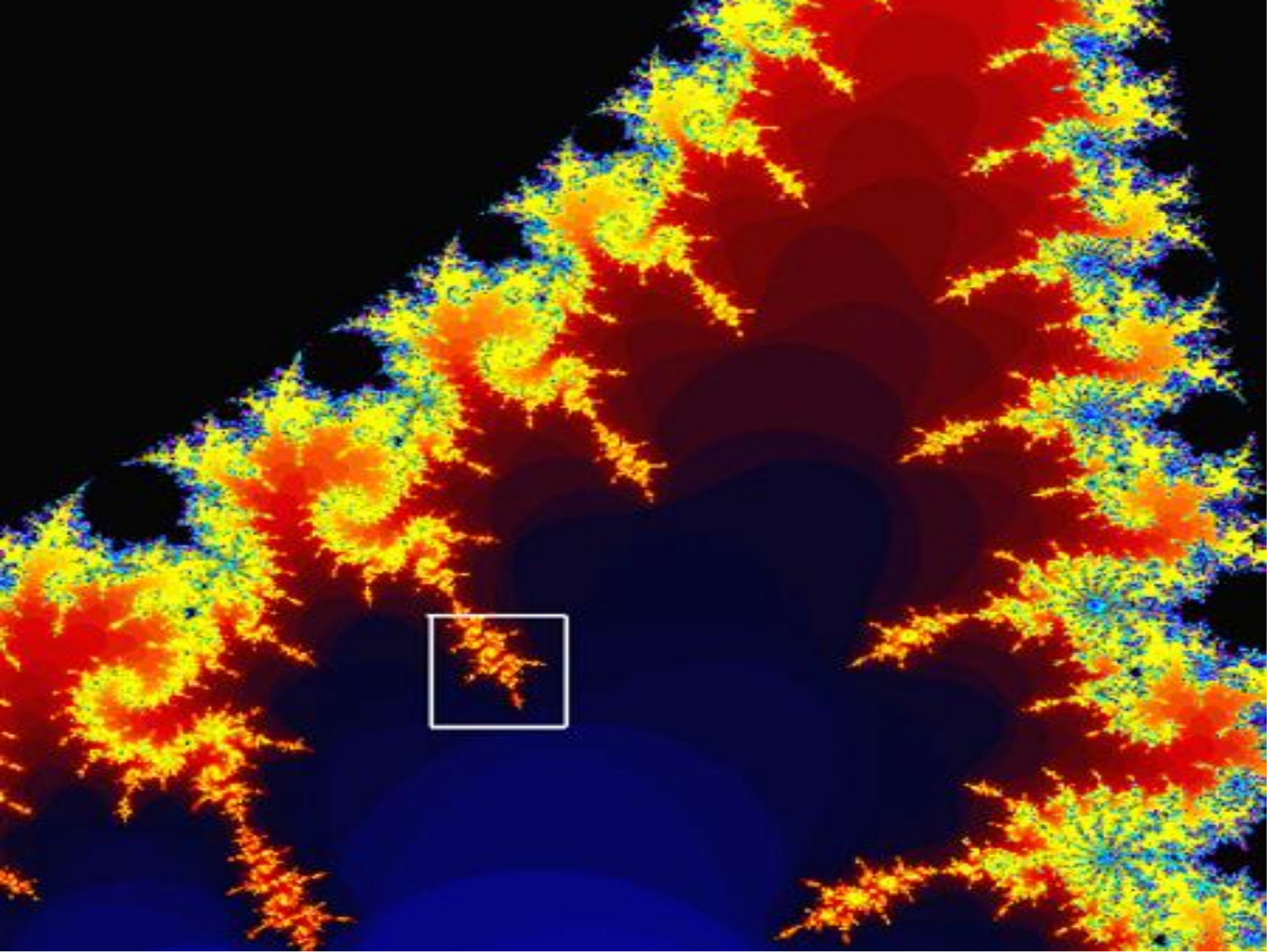
- ◆ **Apparent lack of order or predictability in a system that nevertheless obeys particular laws or rules. Systems, according to chaos theory:**
 - ◆ **Rely upon an underlying order.**
 - ◆ **Are subject to very simple or small systems and events causing very complex behaviors or events (butterfly effect).**
 - ◆ **Are complex and too difficult for us to understand with existing models of prediction.**
 - ◆ **Systems (organizations/organisms) that survive chaotic conditions are “complex adaptive systems”**

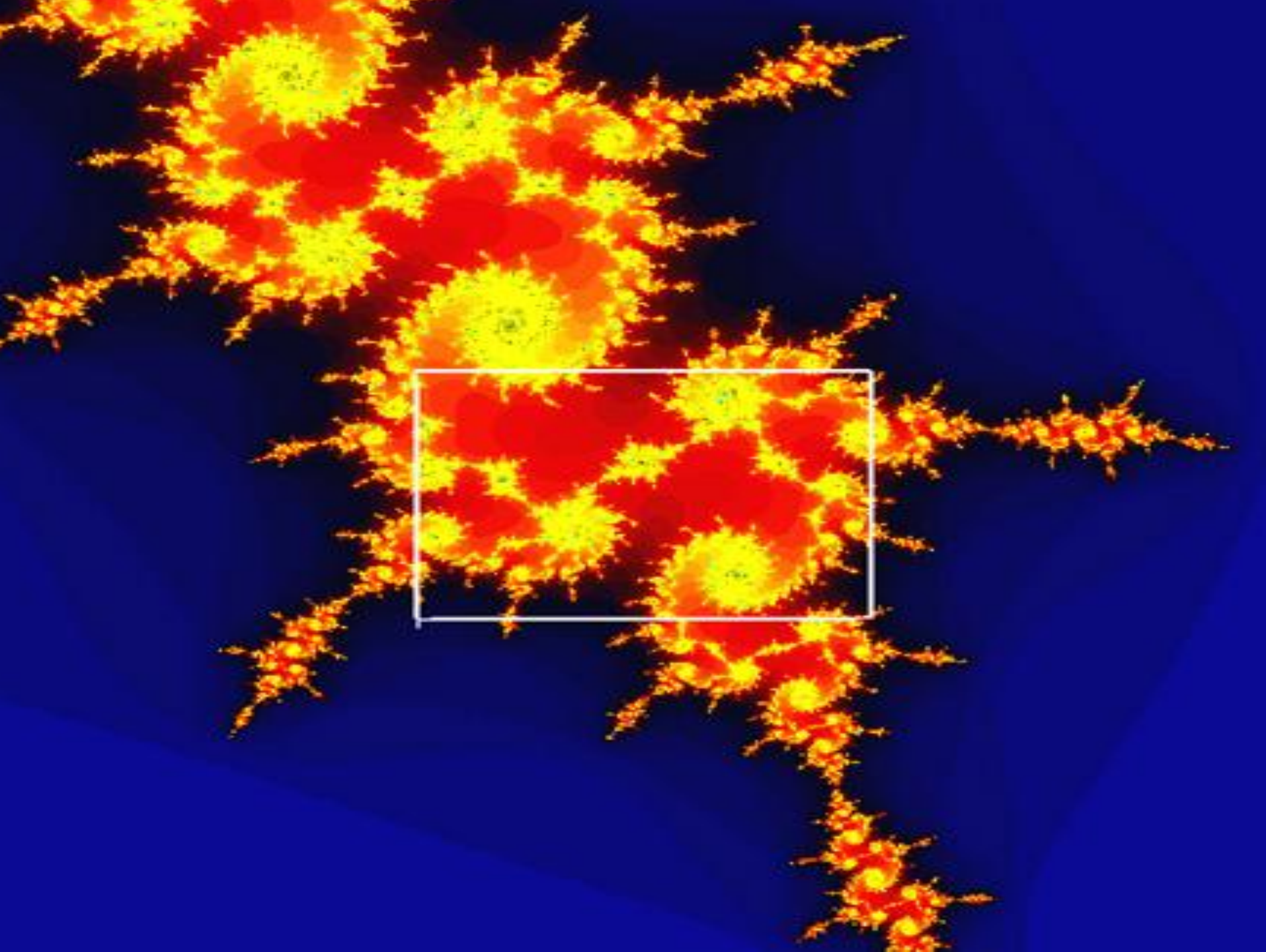


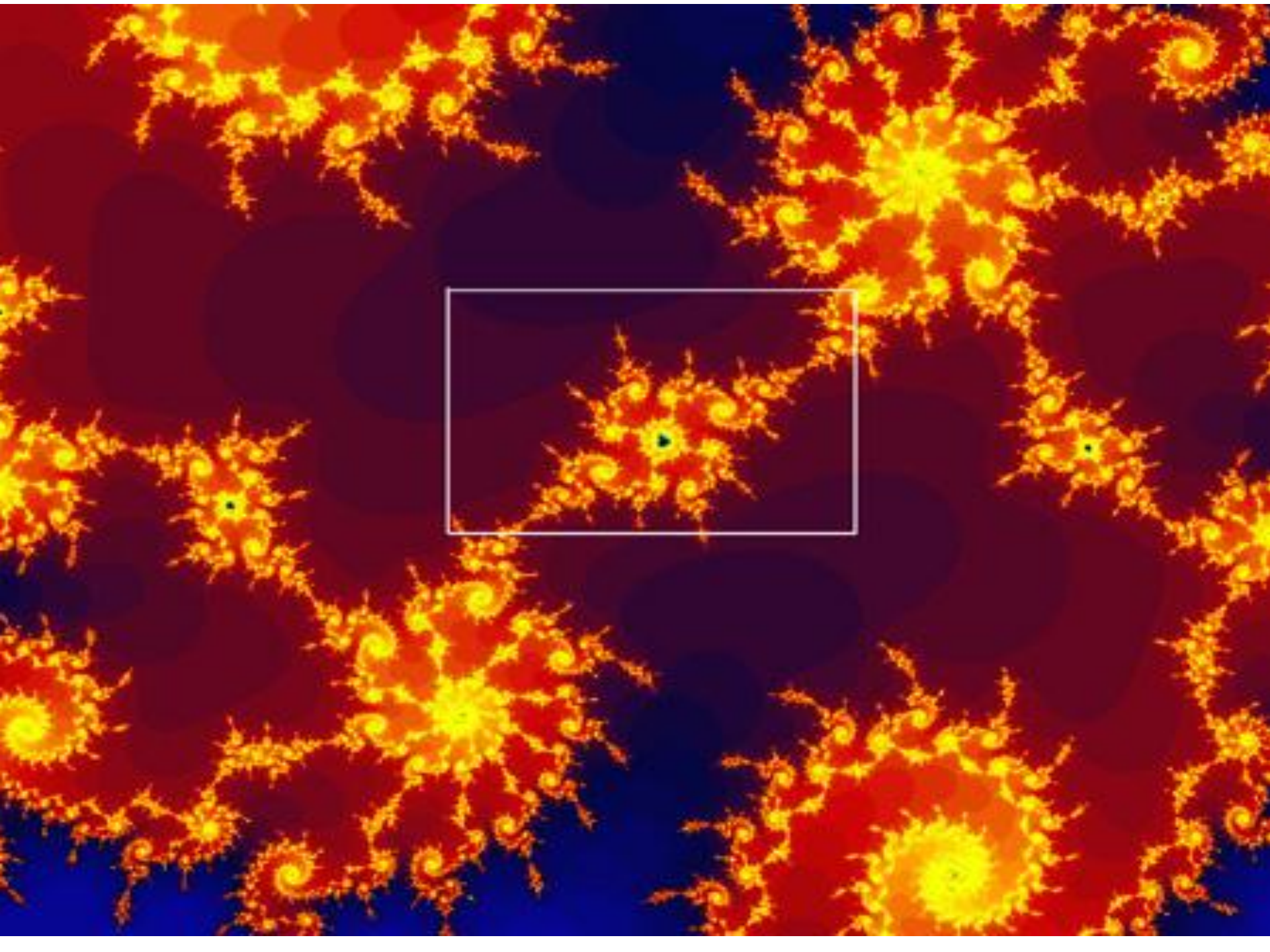


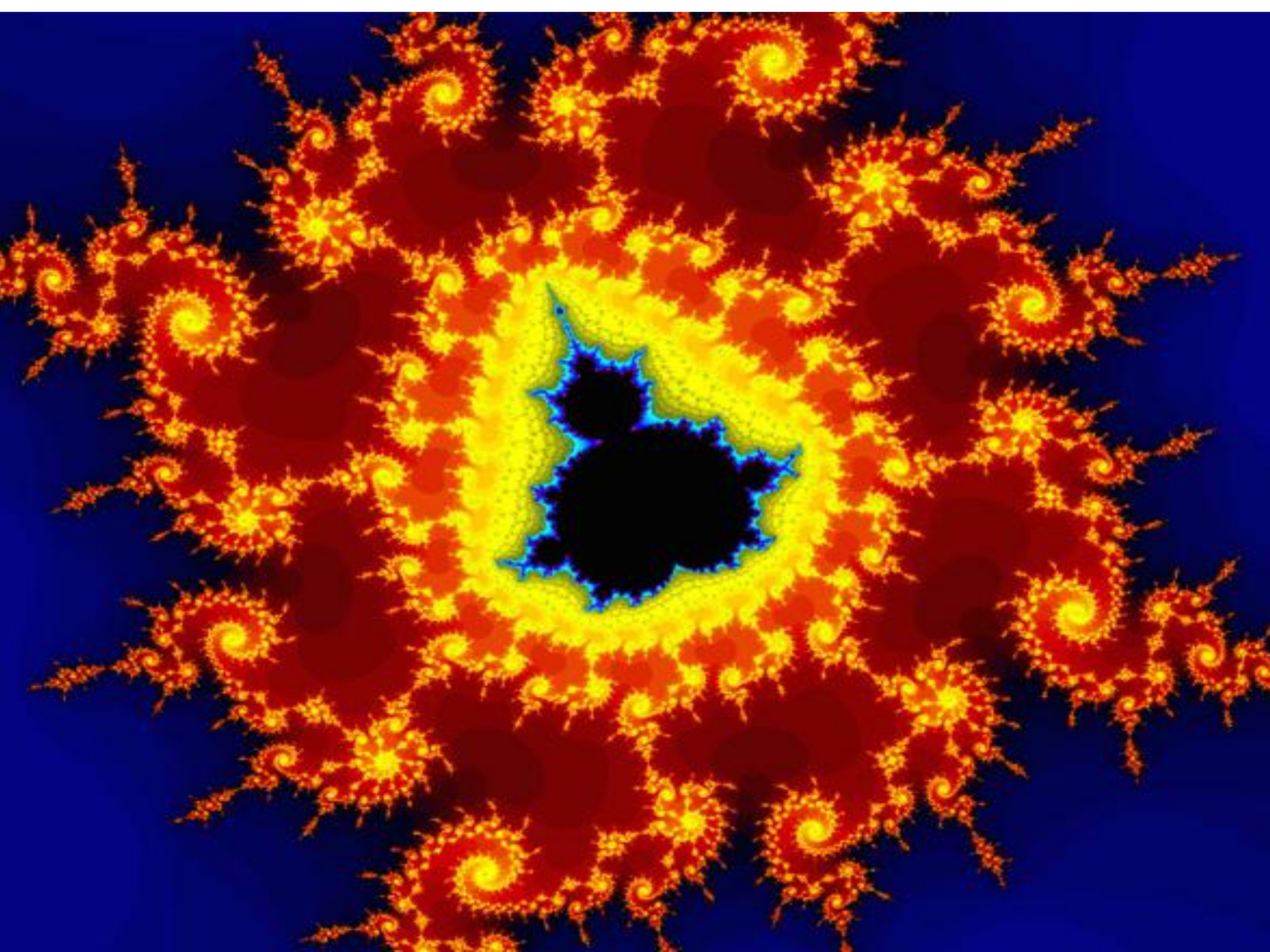
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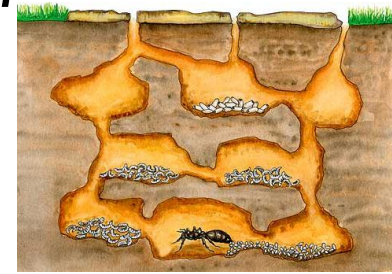


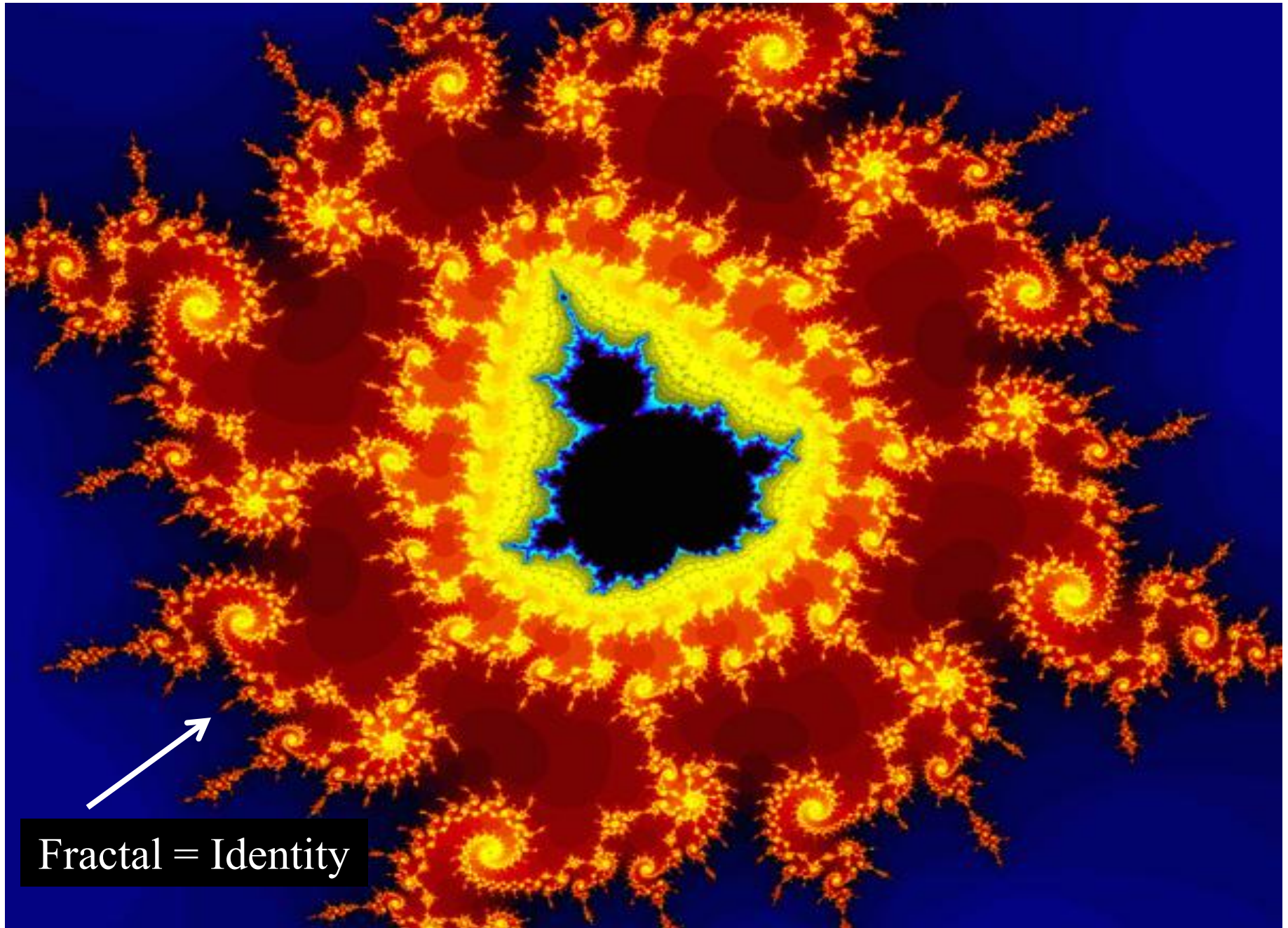




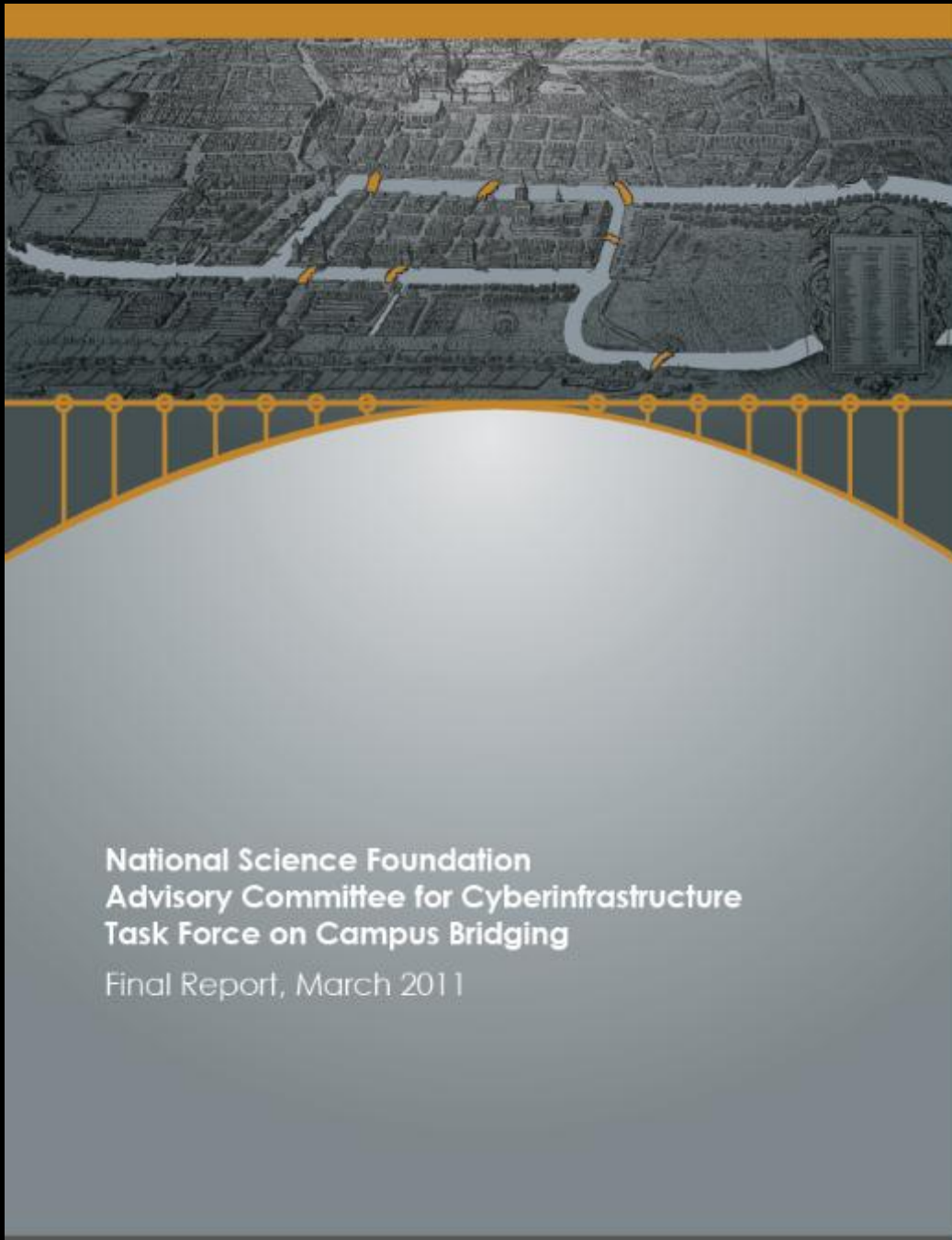
Complex Adaptive Systems

- ◆ Self-similar but heterogeneous
 - ◆ *diversity of function*
- ◆ Strong interdependence of its members
 - ◆ *you need each other*
- ◆ Loose coupling between agents and system
 - ◆ *not too much bureaucratic central control*
- ◆ Self-organizing
 - ◆ *solve issues w/out much top down direction*
- ◆ Adapt best when on the verge of chaos
 - ◆ *Emergence*





Fractal = Identity



National Science Foundation
Advisory Committee for Cyberinfrastructure
Task Force on Campus Bridging
Final Report, March 2011

The Goal - Enable the seamlessly integrated use of CI

- ◆ ... of the individual scientist or engineer <researcher>,
- ◆ ... of the <researcher's> campus,
- ◆ ... of other campuses,
- ◆ ... at the regional, national, or international level.



Findings

- ◆ **Current CI environment is complex**
- ◆ **The reward system for researchers is not optimally aligned**
- ◆ **CI software and current levels of expert support is inadequate**
- ◆ **Current aggregate national CI is not adequate to meet current or future needs of the US**
- ◆ **A robust CI is required for US competitiveness; current funding is inadequate**
- ◆ **Data volumes produced by most new research instrumentation, including that installed at the campus lab level, cannot be supported by most current campus, regional, and national networking facilities.**

Our Vision

- ◆ **MU is committed to providing and supporting the cyberinfrastructure necessary to excel in the discovery, dissemination, and application of knowledge in an environment of rapidly changing technologies, so we may optimally fulfill our research, education, outreach, and economic development missions.**

Planning Principles

- ◆ **The need for CI is not limited to the science and engineering disciplines. Scholars in the humanities and social sciences also require local and remote access to large data sets, instruments, and archives. CI is necessary for the academic enterprise, and critical to MU achieving its goals and fulfilling its teaching, research, outreach and economic development missions.**

Planning Principles

- ◆ **CI is a vital part of the educational endeavor. In particular, graduate students use and benefit from CI, as do the growing number of undergraduate students engaged in research.**

Planning Principles

- ◆ **Research data is an important asset of the University and should be protected and preserved accordingly. The University should provide appropriate data dissemination and data security, preservation and curation services, and researchers need to take advantage of these services.**

Planning Principles

- ◆ **Resource allocation decisions should be based on the “common good” which can benefit many. An architecture that supports integration and is extensible should be designed and followed.**

Planning Principles

- ◆ **Faculty and other users of CI need to be engaged in the process to help prioritize purchase decisions, and assure good stewardship of limited funding and resources. The faculty increasingly need to consider resources available beyond the campus and help assure an effective and balanced use of on-campus and off-campus resources.**

Planning Principles

- ◆ It is necessary to provide a level of “no-charge” CI resources. However, it is also necessary for researchers whose projects demand a higher level of service or resources to have a “for-fee” service available for their use.

Planning Principles

- ◆ **A sustainable business model for CI is likely to include a combination of university funding, student fees, and external project funding. Researchers should be encouraged to work collaboratively with program officers and funding agency staff to budget for and include relevant CI services and resources as a direct cost of research projects.**