

## Research Agenda

### Planned Research Topics For 2024

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#### HYPERION RESEARCH OPINION

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The HPC ecosystem continues to evolve, providing endless avenues to explore and research. Items contributing to these market research opportunities include the rapid introduction and adoption of large language models (LLMs) and other AI-related innovations, increased adoption of HPC resources in the cloud, and heightened emphasis and awareness of sustainability and energy efficiency, to name just a few. The team of analysts at Hyperion Research strive to provide thoughtful, insightful, critical analysis across these topics, as well as the HPC market's many other dimensions. These dimensions include, but are not limited to, market data, technology, innovations, exascale deployments, and vertical application use cases. 2023 proved to be quite eventful, and 2024 is expected to be just as significant.

In addition to already published reports, the analyst team at Hyperion Research has identified several key items resulting in an exciting and in-depth 2024 research agenda. These topics include but are not limited to several crucial areas (listed below) of the HPC market to fulfill each of the Continuous Intelligence Service (CIS) subscriptions (Traditional and Emerging HPC, AI-HPDA, Quantum Computing, WW Technical Server QView Database, WW Technical Server, Verticals and Countries Forecast Database) and the Multi-client End-user Annual Site Survey and HPC User Forum agendas.:

- Market data for on-premises advanced computing infrastructure and spending in the cloud
- The evolving nature of the cloud, including both accelerating growth of users' adoption of the cloud and increasing ways that users are accessing and managing their cloud resources
- Growing pervasive use of AI, including HPC-enabled AI and AI-enabled HPC, HPDA, big data, and data analytics
- Implications of sustainability and energy efficiency challenges on product innovations and data center designs
- Importance of storage and interconnects in the optimization of HPC infrastructures
- Emerging technologies that could have a lasting impact on HPC architectures like quantum computing
- Vertical application software and important use cases
- Key areas for industry sector sites to consider in planning for new procurements

*Note that the specific documents listed may change throughout the year as events occur.*

## 2024 RESEARCH AGENDA

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Publications, studies, and other material produced by Hyperion Research are driven by several elements:

- Thought-leadership documents to address key global advanced computing topics
- Enduring items such as new technologies, HPC sales, vendor market share data and 5-year HPC market forecasts
- Survey results and discussions with end-users and suppliers
- Planned research regarding technology adoption and forecasts of HPC architectural elements, such as compute (e.g., CPUs, GPUs, FPGAs, bespoke silicon), external system interconnects (e.g., ethernet, InfiniBand), storage media (solid state, hard drive, tape), schedulers, and operating systems
- Event-driven analysis to summarize key sessions at conferences and workshops (e.g., SC, ISC, HPC User Forum) and/or provide timely analysis of new announcements (e.g., acquisitions, exascale system acceptance, and intriguing innovation announcements)
- Custom research driven exclusively by sponsoring clients (much of which remains private)

Areas anticipated to be explored by Hyperion Research analysts in 2024 are expected to fall under the research themes outlined in the following table:

**TABLE 1**

### 2024 Research Agenda Themes

#	Themes	Topical Areas
1	Market data for advanced computing infrastructures	<ul style="list-style-type: none"> <li>• Broad on-premises HPC market (technical servers, storage, applications, middleware, services)</li> <li>• Geographies (23 individual countries)</li> <li>• Competitive segments (Supercomputer, Divisional, Departmental, Workgroup)</li> <li>• Sector (Industry, Government, Academia)</li> <li>• Cloud</li> <li>• AI</li> <li>• GPU boards</li> <li>• Arm-based HPC systems</li> </ul>
2	Evolving nature of the cloud, including both accelerating growth of users' adoption of the cloud and an increasing number of ways users are accessing and managing their cloud resources	<ul style="list-style-type: none"> <li>• New cloud access and consumption model</li> <li>• Market positioning and adoption of vendor-driven HPC pay-as-you-go services (e.g., Dell APEX, HPE GreenLake, Lenovo TruScale) vs. public cloud providers (e.g., AWS, Google GCP, IBM Cloud, Microsoft Azure)</li> </ul>

**TABLE 1****2024 Research Agenda Themes**

#	Themes	Topical Areas
3	Sustainability and Energy Efficiency	<ul style="list-style-type: none"><li>• Advanced cooling techniques</li><li>• Coding and architecture optimization tradeoffs between performance, cost, and energy efficiency</li></ul>
4	The growing pervasive use of AI, including HPC-enabled AI and AI-enabled HPC, HPDA, big data, and data analytics	<ul style="list-style-type: none"><li>• Analysis of new and fast growing use cases</li><li>• Non-traditional HPC enterprise users looking to HPC solutions to support AI activities</li><li>• Low and mixed precision in both traditional HPC modelling and simulation workloads and modern AI workloads</li><li>• Market penetration and adoption of AI-specific compute engines</li></ul>
5	Importance of storage and interconnects in the deployment and optimization of HPC infrastructure	<ul style="list-style-type: none"><li>• Supporting heterogeneous workloads</li><li>• Data management vs. storage management</li><li>• Global file systems</li></ul>
6	Emerging technologies that could have a lasting impact on HPC architectures	<ul style="list-style-type: none"><li>• New indigenous processors</li><li>• New accelerators</li><li>• New system designs</li><li>• Quantum computing</li><li>• DNA-based storage and computing</li></ul>
7	Vertical application software	<ul style="list-style-type: none"><li>• Important use cases</li><li>• Migration of codes to the cloud</li><li>• AI applications</li></ul>
8	Key areas for industry sector sites to consider in planning for new procurements	<ul style="list-style-type: none"><li>• Approaches towards new procurements</li><li>• How to balance on-premises and cloud investments</li><li>• Data sovereignty and personal data security concerns</li><li>• Best practices for implementation of HPC and AI infrastructure</li></ul>

Note: Specific documents listed should not be construed as commitments and are included to provide a sense of planned research direction. Document theme and type may change throughout the planning period as events and market shifts occur.

Source: Hyperion Research, 2024

A sample of specific research areas and market forecasts currently planned throughout 2024 are listed in the following table.

**TABLE 2****Planned Research for 2024**

Theme	Topic	Lead Analyst
1	Update on EuroHPC Exascale Efforts	Bob Sorensen
1	WW HPC On-Premises Server 2023 Year End Review	Earl Joseph
1	WW HPC On-Premises Quarterly Server Forecast Update	Earl Joseph
1	WW HPC On-Premises Server by Competitive Segments Forecast Update	Earl Joseph
1	WW HPC On-Premises Server New Competitive Segments	Earl Joseph
1	WW HPC On-Premises Server by Region Forecast Update	Earl Joseph
1	WW HPC On-Premises Quarterly HPC QView	Earl Joseph
1	WW HPC On-Premises AI Server Forecast Update	Earl Joseph
1	WW Storage Market Forecast - Competitive Segment	Mark Nossokoff
1	WW HPC Cloud Forecast Update	Mark Nossokoff
1	WW Storage Market Forecast - On-Premises Verticals	Mark Nossokoff
1	WW Storage Market Update - Cloud Storage	Mark Nossokoff
1	WW Storage Market Update - AI Storage	Mark Nossokoff
1	Worldwide HPC Supercomputer Subsegment Market Forecast Update	Melissa Riddle
1	HPC Verticals Forecast by Competitive Segment	Melissa Riddle
1	Forecast Update: GPU and Accelerator Growth in HPC	Melissa Riddle
1	Developments in Arm-Based HPC System Market	Melissa Riddle
2	Building Multi-agency Data and Information Systems in the Cloud to Support Data Access and Analysis	Jaclyn Ludema
2	GPU Cloud Trends – Past, Current, and Future	Mark Nossokoff
2	Evolving Nature of Cloud Access Methods	Mark Nossokoff
3	The NOAA Software Engineering for Novel Architectures (SENA) Project: Bringing the DOE Exascale Computing Project Expertise to Weather Prediction Workflows	Jaclyn Ludema
3	COP28 AI Innovation Grand Challenge: Can AI Help Developing Countries Reach Their Climate Goals?	Jaclyn Ludema

**TABLE 2****Planned Research for 2024**

Theme	Topic	Lead Analyst
3	Perspectives on Hyperscalar and HPC Data Centers on Adoption of Advanced Cooling Techniques	Jaclyn Ludema
4	End User AI Inferencing: How Much, How Soon, and How to Do?	Bob Sorensen
4	Generative AI's Validation and Verification Process: Building Trust in the HPC Community	Bob Sorensen
4	The Ecosystem of AI and LLM Support Tools	Tom Sorensen
4	Where and How AI Finetuning Happens	Tom Sorensen
4	The Second Year of LLM, How are User Behaviors Changing?	Tom Sorensen
4	A Detailed Look at AI-Specific Hardware	Tom Sorensen
5	2024 Perspectives on File System Landscape	Mark Nossokoff
5	2024 Perspectives on the Interconnect Landscape	Mark Nossokoff
5	EuroHPC Call for Proposal: Innovation Action in Low Latency and High Bandwidth Interconnects	Mark Nossokoff
5	Rise of the Data Platform	Mark Nossokoff
6	Summary of Japan's Emerging QC Activities	Bob Sorensen
6	Emerging Trends in AI Inference Processors	Bob Sorensen
6	NQI 2.0: What New, What's Different?	Bob Sorensen
6	The Rise of QC System Integrators: Challenges and Opportunities	Bob Sorensen
6	Review of QC Government Support: Technology, Policy, and Procurements	Bob Sorensen
6	The Politics of Instruction Set Architectures, What's Next for RISC-V?	Tom Sorensen
6	Changes in HPC Design and the Rise of Modularity	Tom Sorensen
6	How "Superchips" are Being Used in HPC Environments	Tom Sorensen
7	Ongoing Impacts of the Cloud and Accelerated Infrastructure on ISV Application Software	Melissa Riddle
7	User Preferences on Access and Licensing Methods for ISV Application Software	Melissa Riddle
8	The HPC Procurements Process: A Paradigm Shift in the Making?	Bob Sorensen
8	Looking back at Forty Years of USG Policy Support to the HPC Sector: Where to Go From Here?	Bob Sorensen

**TABLE 2****Planned Research for 2024**

Theme	Topic	Lead Analyst
8	Buyers' Expected HPC Spending Changes: On-Premises and Cloud	Melissa Riddle
8	Historical Analysis of HPC Buyers' Expectations vs. Changes in HPC Market	Melissa Riddle
8	HPC Challenges and Opportunities in the Creation and Delivery of Next-Generation Ecological Forecasts	Jaclyn Ludema
8	Uses of HPC Cloud for Current and Future Weather, Water, and Climate Applications	Jaclyn Ludema
8	Select Industry Profiles - Forecasts and Best Practices	Melissa Riddle
8	Focus on Industry Users - HPC and AI Implementation Profiles	Melissa Riddle
8	HPC Sustainability Leadership: Innovation Approaches of the Most Energy-efficient Data Centers and Technology Vendors	Jaclyn Ludema

Note: Specific documents listed should not be construed as commitments and are included to provide a sense of planned research direction. Document theme and type may change throughout the planning period as events and market shifts occur.

Source: Hyperion Research, 2024

**2024 PLANNED PRESENCE AT EVENTS**

In addition to published research, Hyperion Research will also have a presence at various industry events and host multiple [HPC User Forums](#), providing global market updates and facilitating conversations to promote the health of the industry. These 2024 events are summarized in the following table.

**TABLE 3****Planned Presence at Events for 2024**

Event	Dates	Location
SXSW (South by Southwest)	March 8 – March 16	Austin, TX
HPC User Forum - Spring - United States	April 9 - April 10	Reston, VA
Quantum.Tech	April 24 – April 26	Washington, DC
ISC24	May 13 - May 16	Hamburg, Germany

**TABLE 3****Planned Presence at Events for 2024**

Event	Dates	Location
HPC User Forum - Fall - United States	September 4 - September 5	Chicago, IL (Argonne National Lab)
HPC User Forum - Fall - Europe	October 24 - October 25	Stuttgart, Germany (HLRS)
HPC User Forum - Fall - Europe	TBD	TBD
SC24	November 18 - November 21	Atlanta, GA
Q2B	December 1 – December 12	Silicon Valley, CA
HPC + AI Wall Street	TBD	New York, NY

Note: Market update briefings may be live or virtual. Other events may be added as appropriate and demand warrants.

Source: Hyperion Research, 2024

**RESEARCH DOCUMENT TYPES**

Hyperion Research publishes several types of research documents depending on the nature of the research, the timeliness of the information, the depth of the analysis, and the accessibility of the research. The following table summarizes the numerous types of reports and deliverables.

**TABLE 4****Research Document Types**

Document Type	Description	Typical Length
Special Analyses and Special Reports	An in-depth look at a critical area within the HPC ecosystem.	6-10 pages
Market Forecasts	5-year forecasts for a broad range of market areas, including technical servers, cloud, AI, storage, regions, competitive segments, sectors, and vertical use cases.	4-5 pages
HYP_Link	Short piece summarizing a market announcement with insightful analyst commentary	1 page
Quick Take	Brief analysis describing a recent market development. Typical content includes context relative to the market impact, summary of development, and key considerations for vendors, HPC practitioners, and researchers.	4-5 pages

**TABLE 4****Research Document Types**

Document Type	Description	Typical Length
Global Site Survey Results and Reports	Series of sponsored research reports based on the annual multi-client site survey. Limited availability as part of bundled CIS subscriptions.	6-8 page Executive Summaries and access to results dashboard
Technology Spotlight	A sponsored research document describing a key market challenge, several ways to address the challenge, and a real-world example of how the challenge has been addressed. These are typically distributed by the research sponsor(s) and not available as part of a Hyperion Research CIS subscription.	5-9 pages
White Paper	A more in-depth sponsored research document describing a key market challenge, several ways to address the challenge, and a real-world example of how the challenge has been addressed. These are typically distributed by the research sponsor(s) and not available as part of a Hyperion Research CIS subscription.	8-12 pages
HPC User Forum	Summaries of key presentations from HPC User Forum events.	4-5 pages
WW Technical Server QView Database	Pivot table database with a demand-side quarterly perspective of the global HPC market detailing purchases by competitive segments, geographic regions, and processor and accelerator types. Updates provided quarterly within a month after the end of each calendar quarter.	n/a
WW Forecast Database	Database containing global 5-year forecasts covering the broad HPC market, 12 geographies, 4 competitive segments and associated supercomputer subsegments, 3 sectors, and technical server unit shipments (nodes, processors). Updates provided quarterly within a month after the publication of the QView.	n/a

Source: Hyperion Research, 2024

**2023 RESEARCH YEAR IN REVIEW**

A list of research published in 2023 can be found in the [\*Hyperion Research Special Report 2023 Research Summary February 2024\*](#)



## FUTURE OUTLOOK

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The HPC market is vibrant and constantly evolving. From technology innovations to challenging use cases to emerging market trends, the HPC ecosystem will continue to teem with opportunities for critical research and in-depth analysis.

Users, vendors, and HPC practitioners seeking to stay abreast of the broad spectrum of HPC ecosystem events and innovations can all benefit from the slate of studies and research planned by Hyperion Research. Users can gain insights into emerging technologies that can aid their research and discover and identify potential partners and collaborators. Vendors can develop and refine their business planning and market analyses. HPC practitioners can stay on top of innovations across the entire realm of HPC, as well as leverage best-practices (e.g., architectures for specific types of workloads, key considerations for new procurements, profiles of new supercomputer deployments).

## About Hyperion Research, LLC

Hyperion Research provides data-driven research, analysis and recommendations for technologies, applications, and markets in high performance computing and emerging technology areas to help organizations worldwide make effective decisions and seize growth opportunities. Research includes market sizing and forecasting, share tracking, segmentation, technology and related trend analysis, and both user & vendor analysis for multi-user technical server technology used for HPC and HPDA (high performance data analysis). Hyperion Research provides thought leadership and practical guidance for users, vendors, and other members of the HPC community by focusing on key market and technology trends across government, industry, commerce, and academia.

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