InfraVis

InfraVis Annual Report 2024

SUMMARY

In 2024, InfraVis[1] entered a phase of consolidation and growth, further establishing itself as Sweden's national infrastructure for data visualization and analysis. Efforts focused on expanding user engagement, improving service delivery, and strengthening collaboration with other research infrastructures. A second national user call confirmed the increasing demand for visualization support, resulting in a high number of new support projects and a growing volume of helpdesk requests. InfraVis delivered 14 open training events with over 873 participants and continued to provide extensive hands-on training through its in-depth (L3) support projects. Under Module 4: 30 Level 1, 49 Level 2, and 25 Level 3 projects were carried out, serving a broad range of scientific disciplines. Strategic development projects with MAX IV and NAISS were initiated, and ongoing dialogue with additional infrastructures and initiatives. This report has been prepared by the Management Team in collaboration with Node Coordinators and Module Leaders, based on systematically collected statistics and KPIs, in accordance with the Swedish Research Council's reporting format. The Steering Committee has overseen the reporting process and provided input and comments on its content.

POPULAR SCIENCE SUMMARY

InfraVis is a distributed national research infrastructure with financial support from the Swedish Research council and nine Swedish universities. The infrastructure offers data visualization and analysis services to researchers in Sweden through visualization experts, software solutions, and access to high-end visualization laboratories. InfraVis has a unique position not only in Sweden but also internationally, with respect to providing services to all scientific domains from 49 skilled visualization experts adding up to a total of 14,3 FTEs. This forms a strong foundation for meeting the growing needs of the scientific community, including visualization, visual analytics, and related support.

DESCRIPTION OF OPERATIONS

Time plan: Development related to milestones (Mi) and deliverables (D)

M = Module. Other abbreviations will be explained as they occur.

InfraVis progressed according to plan during 2024, with all 2024 milestones and deliverables successfully completed, as outlined in the original 2021 application and updated in the 2023 annual report. All targets defined in the 2021 application have been fulfilled (see Milestones [Mi] and Deliverables [D] in Attachment 1). The infrastructure has continued to develop in line with the GANTT timeline, marked by increasing demand for services across scientific domains.

User group mapping (Mi5.1) shows most applications came from Natural Science and Engineering & Technolgy but also a substantial number from Social Sciences and Humanities, with submissions from all partner universities and several from external institutions. As part of the revised objective introduced in 2023, a second national user call was held in 2024 (D6.1), attracting 37 applications from a wide range of research fields. Of these, 26 projects were granted Level 3 support, set to begin in 2025. In M6, two large collaborative development projects were initiated with other national research infrastructures (Mi6.2): one with NAISS, focusing on integration with HPC and AI/ML resources, and one with MAX IV, where InfraVis support will be directly included as an option when applying for beamtime starting from 2025 (Mi5.2). InfraVis also conducted its evaluation of the start-up years (Mi6.1) through user interviews and forums. A broader user survey is ongoing and will be included in the 2025 report (Mi5.3, D7.2). InfraVis Days were hosted at UmU in March (D5.3) and at LU in November (D6.3), contributing to internal training, coordination, and outreach. Preparatory work for the 2027–2030 application began in

[1] [1] Link to website: https://infravis.se

spring (Mi6.3), followed by strategic dialogue with all partners during autumn (Mi6.4). The Steering Committee held eight meetings in 2024 (D6.2). The communication strategy was adjusted: instead of three internal newsletters per half-year as originally planned, two internal and two external newsletters were published, with increased emphasis on website and social media news (D5.4).

CONTRUCTION, DEVELOPMENT AND OPERATION OF THE INFRASTRUCTURE

M1 Organization and Leadership

The Management Team (MT) coordinated activities across consortium partners in 2024, ensuring module alignment and overseeing central administration, with strategic and operational leadership provided by the director. Node Coordinators (NCs) actively contributed to both user support and infrastructure development, following the Operational Plan 2024. This work enabled meaningful engagement with researchers and other national infrastructures. Two User Forums were held during 2024, at UmU and LU, the latter with both in-person and online participants. Both provided valuable feedback that strengthened user engagement. The Scientific Advisory Board (SAB) participated in InfraVis Days in Lund, contributing to strategic discussions with the MT and Steering Committee (SC), including input to the 2027–2030 funding application. The SC met eight times in 2024.

M2 Outreach and Communication

Serving the scientific community and helping researchers maximize their impact through visualization is one of InfraVis' core pillars. This is achieved through two-way communication. InfraVis has three primary communication channels: (1) The InfraVis website (*infravis.se;*), (2) Social media platforms, and (3) Outreach events. In 2024, InfraVis published two internal and two external newsletters, along with over 20 website news articles and 90 Social media posts. InfraVis has organized and participated in 42 presentations and other events during 2024. These events were attended by approximately 4000 people. An additional channel for information spreading has been the internal web at the different partner universities. Several of the events were co-organized with other research infrastructures and initiatives, including as examples LINXS, Huminfra, SweClarin, MAX IV, and HALRIC.

M3 User Training

User training is central to InfraVis' mission of supporting Sweden's scientific competitiveness. In 2024, InfraVis delivered 14 open training events reaching almost 900 participants and totaling around 100 event hours. In collaboration with others, InfraVis also organized thematic workshops and hackathons on topics including molecular visualization, humanistic AI, and geographic information systems. In parallel, hands-on training was embedded in L3 support projects, offering tailored guidance aligned with users' research data and domain-specific challenges (resulting in hundreds of user training hours within the projects).

In both M2 and M3 there was a reduced number of activities in 2024. Instead, more time was spent on M4 support, M6 activities and selected M2 and M3 activities.

M4 User support

InfraVis employs a helpdesk model to support projects: 1) Level 1 (L1) support is up to 10 hours; 2) Level 2 (L2) support is up to 80 hours; and 3) Level 3 (L3) support is over 80 hours, which, from 2023, requires a user-fee. During 2024, InfraVis handled 153 L1-L3 support project applications. Of these, InfraVis carried out 25 L3, 49 L2, and 30 L1 projects. This totals 104 projects with 120 users. The applied user projects came from diverse domains including the Natural Sciences (42 projects) and Engineering & Technology (25), followed by Medical & Health Sciences (19), Social Sciences (14), Humanities & Arts (12), and Agricultural & Veterinary Sciences (4). Applications were received from all partner universities, along with 22

submissions from institutions outside the consortium. The projects were given support from the InfraVis node with the best suited expertise, regardless of geographical location. Several of the larger projects were supported by cross-node teams. A number of these projects also include software curation. The 2024 Open Call for L3 support received 37 applications from a broad range of research areas. Of the applications for L3 support, 26 were granted L3 support, and 11 were allocated L2 support. These projects, plus the ongoing projects, form the base of our user support in 2025 and 2026.

M5 Software Curation and Development

InfraVis has, during 2024, provided curation of seven software instances, in both specific user support projects as well as development of software to provide as a service for the user community. Examples include applications for: crowd-sourced urban data; for tomographic data applied in AR; and an application and workflow to visualize tomographic datasets in the immersive CAVE system. Other examples are a pipeline to extract meshes for large volumetric datasets; and a web application which is fully dynamic for any kind of .csv/.tsv data. Moreover, M5 has developed the inventory of skills and available software presented on the web site.

M6 Infrastructure development to improve services

InfraVis has five development projects during 2024: three user-support projects (M4 and M6) and two collaboration projects with other infrastructures (M6); see more about the latter below in section 'Interaction with other research infrastructures.

M7 Internal training and self-evaluation

As part of the evaluation for the 2027–2030 VR funding application, InfraVis assessed its strengths, challenges, and development needs, confirming that knowledge and expertise remain its core assets. To support continuous development, an inventory of IAE skills is maintained to guide team planning (M4) and training needs (M7). In 2024, M7 delivered seven internal training sessions. Each session involved 5-30 IAEs, and covered topics such as GUI development in Python, Inviwo software, visual storytelling, motion capture, network analysis in Gephi, as well as TOPdesk training. Additional workshops were held during InfraVis Days at UmU and LU, focusing on best practices, project management, and skills development, contributing to stronger cross-node collaboration. The 2024 evaluation of InfraVis services included input from two User Forums, ten interviews, and a user survey launched in late 2024, providing valuable insights to guide future training and service improvements.

Interaction with other research infrastructures

Collaboration with other research infrastructures remains a central priority for M6, ensuring that InfraVis actively contributes to a broader ecosystem for scientific data management, analysis, and visualization. Achieving interoperability and delivering effective services to users of these infrastructures requires tailored solutions that seamlessly integrate with diverse data workflows and computational environments. In 2024, InfraVis initiated development projects with MAX IV and NAISS, aiming to enhance data integration, visualization workflows, and computational accessibility for users. InfraVis has also continued its strategic engagement with other national infrastructures and initiatives, while also expanding its interactions with local research infrastructures, exploring collaborative opportunities to support their user communities with customized visualization solutions.

Data management and need for supporting e-infrastructure

InfraVis Application Experts follow the data management plan (DMP), which will be updated in 2025. Chalmers' E-commons supported the initial e-infrastructure. In 2024, InfraVis began a development project with NAISS and continued its collaboration with SND on the researchdata.se, with both partnerships expected to continue in 2025.

Changes in the organization

In 2024, InfraVis introduced a vice-director role. The vice-director was previously one of the three Technical Managers (TMs). During late autumn 2024 InfraVis was left with only one TM. In parallel, and in alignment with the Operational Plan 2024, the coordination of modules began transitioning from the TMs to designated module leaders. Throughout the year, the leadership and coordination of individual modules were gradually transferred, specifically for M2, M3, and M7. The total number of FTEs in InfraVis was during 2024: 18,42 FTE whereof 14,28 FTEs as IAEs.

The work of the Steering Committee

The Steering Committee held eight meetings in 2024 to support InfraVis' development, focusing on the user call, approval of projects, outreach, recruitment, user support, IAE training, the Scientific Advisory Board, and strategic input to the 2027–2030 VR application.

Financial outcome

InfraVis started 2022 and has since its inception strategically expanded both capacity and staffing levels throughout 2024 in response to increased demand and growth. Reflecting the planned gradual strategic growth, approximately 50% of the total budget is allocated to the final two years. This aligns with InfraVis operational plan, anticipating higher activity and resource demands as InfraVis reaches maturity. Reporting time into modules remains incomplete (including a proportion of the time for M6 and M7 activities been partially accounted for in M1), indicating actual efforts in M2, M3, M6, and M7 exceeding what is currently reported. InfraVis continued to develop and implement the user-fee model including both in-kind contribution (approximately 1.4 million SEK) and direct payments (the cash contribution was 200,000 SEK). InfraVis had contracted services costs for the use of supporting e-infrastructures (NAISS). Instead, VR has allowed to use 600,000 SEK of these 1,5 million for development projects with NAISS and MAX IV that started autumn 2024 (M6). In 2024, InfraVis reported contracted services (köpta tjänster) totaling 638,230 SEK, of which 531,000 SEK replaced planned salary expenses at Chalmers.

Key Performance Indicators (KPIs)

Category 1 - *InfraVis staff*. During 2024 InfraVis had 64 staff members on 18,4 FTEs. 5,3 FTE were reported on M1, M6 and M7 focusing on leadership, infrastructure development, internal training and self-evaluation. 0,7 FTE was reported in M2, 1 FTE in M3, 10,4 FTE in M4, and 1 FTE in M5. Most individuals were involved in several modules. For 2024, InfraVis reports fewer FTEs compared to 2023 due to an error in the 2023 reporting. The financial officers based the 2023 figures on projected staffing, which included planned but ultimately unrealized recruitments. As these positions were not filled in 2023, the reported FTEs inaccurately reflected planned rather than actual staffing levels.

Category 2 - *Services (M3-M5).* M3: 14 user training events reaching 873 individual users, as well as user training carried out in the L3 projects. M4: Applied projects: 36 L1, 51 L2, and 66 L3 projects. Carried out projects: L1; 30, L2; 49 and L3; 25. In total, 153 applied and 104 carried out projects. 37 applications are scheduled for 2025 and 12 were cancelled or rejected. M5: 7 SW curation and development projects.

Category 3 - *Individual users M2-M5.* Totally, 4869 used our services in M2-M5. Of these 873 were user training participants (M3) and 3889 were participants in outreach and communication events (M2). 193 individual users applied for M4 support, of which 120 were carried out. 7 software and curation projects were applied for and carried out (M5), or which 4 were created for a larger user group (not applied for by a single user).

Category 4 – *Type and quantity of use*. The InfraVis staff provided, in total, 379 hours of M2 and 99 hours for M3 activities for users. The M4 user support projects reported 230 hours for L1, 1574 hours L2, and 4302 hours for L3. The lab facilities are regularly used for all modules (M1-M7). InfraVis has no record of data for physical vs remote access in M4. Physical access is calculated with template: L1: 0 %, L2: 10%, L3: 15%.

Category 5 and 6 – *Gender and positions for employees at InfraVis and governing/advising bodies:* The management and steering of InfraVis 2024 was well-balanced at the level of Steering Group (3W:4M), SAB (2W:2M) and the core management team (2W:2M). As a whole, InfraVis internal leadership teams (M1) have an even gender distribution: The management team incl the admin coordinator, financial and the communication officer (5W:2M), the node coordinators (2W:6M), and the module leaders (3W:2M). Of InfraVis 14,28 FTE application experts are 11,78 FTE men and 2,5 FTE women. InfraVis' uneven gender distribution between IAEs reflects the gender gap within computer technology education. Even though more women study technology, in 2022 only 13% women graduated with a master exam in computer technology and 21% from information technology. For InfraVis' remaining IAE recruitments, gender balancing will be a key consideration. InfraVis has held User Forums at the two InfraVis Days meetings in Umeå and Sundsvall, and together with MAX IV at its user meeting in Lund. In total 15 users (4W:11M) participated in the User Forums. The applied user support projects (M4 L1+L2+L3) included more men (130 M users) than women (63 W users). Regrettably, complete gender documentation for M2 and M3 events is lacking. However, based on the available data, participation comprises 60% men and 40% women.

Category 7 – *Output.* InfraVis has 3 kinds of output: (1) 7 curated software were created within the user support projects and infrastructure development projects. (2) 15 publications have acknowledged InfraVis, and (3) Third assignment: Totally 12 outreach events primarily dedicated to scientist have also reached out to a broader audience. InfraVis and its users presented visualizations to the public and various stakeholders at several events. These included the public sector, such as Trafikverket and Stockholm City, as well as cross-sectional organizations, like Centrum för Management i Byggsektorn and MedTech Science and Innovation Days. Additionally, InfraVis was showcased at open houses at partner universities and public exhibitions, including Norrköpings Visualization center. An augmented reality visualization of Sweden's energy consumption footprint was also displayed at a public exhibition as part of a FORMAS project.

Publications list

InfraVis was acknowledged in 15 publications. Given the high number of ongoing and recently finished support projects, InfraVis expects many high-quality publications in the coming years.

Gender equality

InfraVis monitors all activities and reflects upon gender distribution. Comments concerning gender are dealt with under Category 5 and 6 in the Key Performance Indicators section.

Risk analysis

InfraVis faced several challenges in 2024 as operations grew. Recruitment has been a challenge and the planned expansion of new IAEs will not be completed until 2025. The open user call added to the workload of IAEs already handling 2023 projects and rising TOPdesk requests, while the Management Team balanced leadership with ongoing protocol development. Continued workflow harmonization, training, and expert seminars supported knowledge sharing and helped strengthen InfraVis capacity and long-term sustainability.

Educational activities, outreach and user support

Educational activities, outreach and user support are all central activities in InfraVis and described in M2, M3, M4, M5 and M7 above.

Attachment 1: InfraVis updated time-plan (2023) as a Gantt chart based on the application to the Research Council for funding 2022-2026.

InfraVis Milestones (M) & Deliverables (D)

2022			2023		2024		2025		2026	
March (0) **Startup**	June (1) **6-month M&D**	December (2) **12-month M&D**	June (3) **18-month M&D**	December (4) **24-month M&D**	June (5) **30-month M&D**	December (6) **36-month M&D**	June (7) **42-month M&D**	December (8) **48-month M&D**	June (9) **54-month M&D**	December (10) **60-month M&D**
M0.1. **Pre-kickoff meeting KTH Nov 9 2021**	M1.1. **Definition of recruitment process**	M2.1. **All internal & most external recruitment completed**	M3.1. **Pilot studies completed**	M4.1. **Optimized full TOPDesk operation**	M5.1 **User group mapping**	M6.1 **Full evaluation of 2- ops**	M7.	M8.1.	M9.	M10.1. **Evaluation for the full period**
M0.2. **Kickoff at Gothenburg March 23**	M1.2. **Development of operations and protocols**	M2.2. **All currently needed HW & SW purchased**	M3.2. **Proposed adjustments**	M4.2. **Optimized InfraVis protocols**	M5.2 **Define development project with at least 1 other RI**	**M6.2 Start up development project with at least 1 other RI**			D9.1. **Continuation application**	M10.2. **Implement continuation**
D0.1. **Steering Committee meeting - Jan**	D1.1. **Pilot project plan to develop infrastructure**	M2.3. **All protocol definitions outlined**	D3.3. **Protocols for interfacing with InfraVis in: Box, Trello, Meetings, documents**	D4.1. **Pilot study report**	M5.3 **Follow-up of user call 2023**	M6.. **Preparation for continuation and application 2027 and onwards**	D7.1 **Send application 2027 and onwards**	D8.1. **Evaluation report**	D9.2. **Activity plan**	D10.1. **Evaluation report**
D0.2.. **Steering Committee meeting – Feb**	D1.2. **InfraVis Plan for Gender Equality**	M2.4. **Full operation TOPDesk Nov7**	D3.4. **Report to VR**	D4.2. **InfraVis adjustments proposal**	D5.1 **Report to VR**	M6.2. **Present plan and strategy for application**	D7.2. **Report to VR**		D3.4. **Report to VR**	
D0.3 **Steering Committee meeting - Mar**	D1.3. **Steering Committee meeting - April**	D2.1. **User training workshops and courses**	D3.5. **Scientific Advisory Board assembled**	D4.3. **Validated protocols document**		D5.1. **User Call 2024**				
	D1.4. **Steering Committee meeting – May**	D2.2. **InfraVis Communication Strategy**	D3.6. **InfraVis Data Management Plan DMP**	D4.4. **Steering Committee meetings**	D5.2. **Steering Committee meetings (at least 2/half year)**	D6.2. **Steering Committee meetings (at least 2/half year)**	D7.1. **Steering Committee meetings (at least 2/half year)**	D8.1. **Steering Committee meetings (at least 2/half year)**	D9.3.**Steering Committee meetings (at least 2/half year)**	D19.2. **Steering Committee meetings (at least 2/half year)**
	D1.5. **Steering Committee meeting - June**	D2.3. **Steering Committee meeting - Sep**	D3.7. **Steering Committee meeting – Jan**		D5.3 **Infravis Days Umeå**	D6.3 **Infravis Days Lund**	**Infravis Days**	**Infravis Days**	**Infravis Days**	**Infravis Days**
		D2.4. **Steering Committee meeting - Oct**	D3.8. **Steering Committee meeting - Mar**		D5.4. **InfraVis internal/external Newsletter (3/half year)**	D5.4. **InfraVis internal/external Newsletter (3/half year)**	D5.4. **InfraVis internal/external Newsletter (3/half year)**	D5.4. **InfraVis internal/external Newsletter (3/half year)**	D5.4. **InfraVis internal/external Newsletter (3/half year)**	D5.4. **InfraVis internal/external Newsletter (3/half year)**
		D2.5. **Steering Committee meeting - Nov**	D3.9. **Steering Committee meeting - April**							
			D3.10. **Steering Committee meeting - June**							

Mod.	Modules, Activities & Deliverables	2022 Q1	2022 Q2	2022 Q3	2022 Q4	2023 Q1	2023 Q2	2023 Q3	2023 Q4	2024 Q1	2024 Q2	2024 Q3	2024 Q4	2025 Q1	2025 Q2	2025 Q3	2025 Q4	2026 Q1	2026 Q2	2026 Q3	2026 Q4
	Milestones*	M1	M2		M3		M4		M5		M6		M7		M8		M9		M10		M11
	Deliverables*	D1	D2		D3		D4		D5		D6		D7		D8		D9		D10		D11
1	**Organisation and Leadership**	2022				2023				2024				2025				2026			
1.1	Daily operation management	X	X	X	X	X	X	X	X	X											
1.2	Kick-off meeting	X																			
1.3	Recruitment process overview	X	X																		
1.4	Protocols and processes	X	X																		
1.6	Start-up and recruit members to the User Forum	X	X																		
1.7	InfraVis Days: Mars/April & September			X			X		X												
1.7.2	User Forum Mars/April						X		X												
1.7.3	Scientific Advisory Board (SAB)						X														
1.8	Steering Group meetings	X	X	X	X	X	X		X												
1.9	Half-way evaluation																				
1.10	Plan for next step - the direction after Year 5																				
2	**Outreach and Communication**	2022				2023				2024				2025				2026			
2.1	Website and social media	X	X	X	X	X	X	X	X	X											
2.2	Newsletter		X		X		X		X												
2.3	Information material (printed and digital)		X		X																
2.4	Outreach activities	X	X	X	X	X	X	X	X	X											
2.5	Open house			X		X															
3	**User Training**	2022				2023				2024				2025				2026			
3.1	Definition of event types and target groups	X	X	X	X			X													
3.2	Pedagogical design of training events		X	X																	
3.3	Pilot studies of training events		X	X																	
3.4	Execution of training events							X													
3.5	Evaluation and analysis																				
4	**User Support**	2022				2023				2024				2025				2026			
4.1	Set-up helpdesk., support operations				X	X	X	X	X	X											
4.2	Protocols for mid-level			X	X	X	X	X	X												
4.3	Protocols for in-depth support			X	X	X	X	X	X												
4.4	Evaluation protocols and analysis						X	X													
4.5	Execute User support			X	X	X	X	X	X	X											
5	**Software Curation and documentation**	2022				2023				2024				2025				2026			
5.1	Survey of existing platforms, state-of-the-art					X	X	X	X												
5.2	Define and produce documentation templates						X	X													
5.3	Define, setup and maintain repository						X	X	X	X											
6	**Infrastructure development to improve services**	2022				2023				2024				2025				2026			
6.1	Needs elicitation from other infrastructures	X	X					X	X												
6.2	Monitor needs from User Support				X	X	X	X													
6.3	Pre-studies for development			X	X			X	X												
6.4	Defined projects execution					X	X	X		X											
7	**Internal training & self-evaluation for knowledge sharing**	2022				2023				2024				2025				2026			
7.1	Survey internal training needs						X	X													
7.2	Define continuous evaluation methodology						X	X													
7.3	Pedagogical design of internal training events		X	X																	
7.4	Execution of training events		X	X		X	X	X	X	X											
7.5	Evaluation and analysis							X													