

#	YEAR	TITLE	VENUE	1st AUTHOR	ID	DATA-FIRST	EXCERPTS	SEED	DOMAIN / DATA	REASON FOR SELECTING AS EDGE CASE
1	2009	ABySS-Explorer: Visualizing Genome Sequence Assemblies	TVCG	Nielsen	ABySS-E	no	<ul style="list-style-type: none"> * Motivated by the needs of genome analysts. * Explored the use of a graph as a novel encoding for genomic sequence data * Our visualization has been adopted by a number of genome analysts and subjected to iterative design based on their feedback. 	Goals2Tasks		
2	2011	BallotMaps: Detecting Name Bias in Alphabetically Ordered Ballot Papers	TVCG	Wood	BallotMaps	edge case (self-use)	<ul style="list-style-type: none"> * To identify the degree to which the position of candidate name affects numbers of votes received; and to develop a data visualization design appropriate for exploring the spatial and non-spatial influences over candidate votes * This design study examines results of the Greater London local elections held on the 6th May 2010 	Goals2Tasks	ballot paper	"The aims are timely because access to detailed digital electoral results and legislation is becoming increasingly easy (e.g. [4, 6, 15]) and is considered an important aspect of participatory democratic accountability (e.g. [7]."
3	2011	BirdVis: Visualizing and Understanding Bird Populations	TVCG	Ferreira	BirdVis	no	<ul style="list-style-type: none"> * In order to answer even simple questions about a single species, several plots and maps are created by the modeling expert, which are then manually composed (e.g., using PowerPoint) for the ornithologists to review. The large number of visualization leads to a cognitive overload, making it hard to identify patterns and correlations among them. * BirdVis was developed as part of a collaboration among computer scientists, statisticians, ornithologists, and biologists. The system is the first to provide an array of visualizations that can be combined to give insights into the different aspects of large-scale dynamic bird distribution models. 	Goals2Tasks		
4	2012	Visualizing Network Traffic to Understand the Performance of Massively Parallel Simulations	TVCG	Landge	BoxFish	no	<ul style="list-style-type: none"> * Even for experts it is difficult to predict how a set of high level data exchanges will be expressed on the hardware interconnect, because both the messaging layer and hardware routers are free to decompose and redistribute to optimize the transfer. Our ultimate goal is to understand how and why problems such as network contention and unnecessary dependencies form, so that we can avoid them. * Our team consists of a mix of experts in visualization, performance analysis, and computational science all of which contributed to the design of the tool. We are actively using the tool to study the performance of several massively parallel simulation codes 	Goals2Tasks		
5	2013	Entourage: Visualizing relationships between biological pathways using contextual subsets	TVCG	Lex	Entourage	no	<ul style="list-style-type: none"> * While the analysis of relationships between multiple pathways is an important task in many application scenarios, our development of the Entourage technique was driven by three domain goals in drug discovery. We have been in close collaboration with an early stage drug discovery research group from a large pharmaceutical company 	Goals2Tasks		
6	2014	MovExp: A Versatile Visualization Tool for Human-Computer Interaction Studies with 3D Performance and Biomechanical Data	TVCG	Palmas	MovExp	no	<ul style="list-style-type: none"> * Recently, a method was proposed [11] that allows a cost-effective assessment of user performance and physical ergonomics. It works by first capturing the 3D movements of a human in a laboratory setting, and then numerically simulating the biomechanics. This is called motion-capture-based biomechanical simulation. The resulting data sets are multidimensional (typically around 400 variables) and provide a rich description of human movement. * This paper presents MovExp (Movement Explorer), a versatile visualization tool for HCI data sets, particularly aimed at analyzing performance and biomechanical data. * The research leading to this paper followed the problem-driven approach as described in the Design Study Methodology * We have worked with an HCI group for two years on empirical HCI projects * At the beginning of this collaboration, the request was to "provide tools to tap the rich resource of performance and ergonomics data from the mocap-based biomechanical simulation for the purposes of HCI research." 	Goals2Tasks		
7	2010	MulteeSum: A Tool for Comparative Spatial and Temporal Gene Expression Data	TVCG	Meyer	MulteeSum	no	<ul style="list-style-type: none"> * scientists are faced with the challenge of integrating nonspatial gene expression measurement data with the spatial location of cells in an organism and, moreover, comparing this data across multiple related species. * We collaborated with a group of these scientists to develop a visualization tool that enables this analysis 	Goals2Tasks		
8	2014	NeuroLines: A Subway Map Metaphor for Visualizing Nanoscale Neuronal Connectivity	TVCG	Al-Awami	NeuroLines	no	<ul style="list-style-type: none"> The idea of NeuroLines originated in initial meetings with our collaborators where they voiced their dissatisfaction with the lack of neurite visualization approaches that focus on connectivity instead of on a complete 3D reconstruction of the segmented structures. Our first prototype depicted neurite connectivity as an abstract 2D node-link diagram 	Goals2Tasks		
9	2011	Visualization of Parameter Space for Image Analysis	TVCG	Pretorius	Paramorama	no	<ul style="list-style-type: none"> To address the issues associated with parameter optimization raised in Section 1 (time cost and memory load, leading to inadequate exploration of parameter space and suboptimal quality), we analyzed the requirements of CellProfiler users. Based on this, we devised a high-level strategy that required work on two fronts. First, we developed a CellProfiler plug-in that samples the input parameter space and generates corresponding output. Second, we developed a visualization tool to let users interactively explore the data generated by our sampler. 	Goals2Tasks		
10	2016	Poemage: Visualizing the Sonic Topology of a Poem	TVCG	McCurdy	Poemage	no	<ul style="list-style-type: none"> * We conducted a two-year design study with poetry scholars and practitioners * During this design study, we encountered several specific challenges that affected our design process. First, supporting close reading of poetry is a truly wicked problem [6, 49]: not only was it initially unclear as to what to visualize in a poem, but the design space for creating visual representations of poems and their features was completely open, since the use of technological tools as direct interventions in close reading (as opposed to in pedagogy and instruction) is still almost unknown to literary scholars 	Goals2Tasks		
11	2014	Combing the Communication Hairball: Visualizing Large-Scale Parallel Execution Traces using Logical Time	TVCG	Isaacs	Ravel	no	<ul style="list-style-type: none"> * Understanding, let alone optimizing, the behavior of a massively parallel simulation code is a significant and largely unsolved challenge * What is missing are visualization techniques that provide productive analysis that is abstract enough to handle large process counts but detailed enough to provide new insight. * Given the goals of performance experts — understand and optimize the behavior of codes — and the state of the existing trace analysis tools, we have identified three design goals for an improved trace visualization. A visualization must: ... 	Goals2Tasks		

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12	2009	SellTrend: Inter-Attribute Visual Analysis of Temporal Transaction Data	TVCG	Liu	SellTrend	no	<p>* To conduct more in-depth analysis on the distribution and structure of failures, company analysts currently use a web-based interface to issue database queries that specify parameters of failed transactions they want to examine, and they download the results as Excel spread- sheets for further analysis. These tools, however, are inadequate for the problem and the task remains difficult.</p> <p>* We adopted a user-centered design methodology and conducted formative evaluation with the technology specialists from Travelport throughout the design process. We continuously gathered feedback to modify and improve the design. In the meantime, our understand- ing of the data set and the problem domain deepened significantly as we moved from designing and implementing prototypes to deploying and incorporating the system into real work settings.</p>	Goals2Tasks		
13	2010	SignalLens: Focus+Context Applied to Electronic Time Series	TVCG	Kincaid	SignalLense	no	<p>* The specific problem we are trying to address is to design a compact visualization that provides both global context and local details for long duration signal traces.</p> <p>* We realized there was a critical need to better manage the visual display of very large signal traces that would enable a compact representation of the entire context of the trace as well as inspection of low-level details of interest.</p>	Goals2Tasks		
14	2012	SnapShot: Visualization to Propel Ice Hockey Analytics	TVCG	Pileggi	SnapShot	no	<p>* In cooperation with a professional hockey analyst, we have began to explore whether visualization could be advantageous for competitive hockey strategy. We utilized a user-centered methodology for designing a system, with our consulting analyst representing the "user".</p> <p>* Our professional analyst identified the five most crucial variables of the available data to his investigations: the length of the shot, whether the shot was a goal or not, whether the shooter was on the home team or the away team, the shooter's team, and the location the shot was taken from on the ice.</p> <p>* The data set our analyst provided consists of 81,158 data points, representing each shot officially recorded by the NHL's stat keepers ...</p>	Goals2Tasks		
15	2013	SoccerStories: A Kick-off for Visual Soccer Analysis	TVCG	Perin	SoccerStories	edge case	<p>* Currently, most analyses on such data relate to statistics on individual players or teams. However, soccer analysts we collaborated with consider that quantitative analysis alone does not convey the right picture of the game, as context, player positions and phases of player actions are the most relevant aspects. We designed SoccerStories to support the current practice of soccer analysts and to enrich it, both in the analysis and communication stages.</p> <p>* A new generation of soccer data is now available, as some companies [13] collect and provide extensive data covering almost all professional soccer championships, with a wealth of multivariate information related to time, player positions, and types of action, to name a few.</p> <p>* To better understand the mechanisms behind game analysis (e. g., supporting tools, focus on specific parts of a game) we conducted interviews with four soccer experts of various types: two online journalists, one Opta Sports soccer specialist and one professional sports trainer.</p>	Goals2Tasks	sports	The motivation behind this work seems to origin from a new generation of soccer data "covering almost all professional soccer championships, with a wealth of multivariate information related to time, player positions, and types of action".
16	2014	TenniVis: Visualization for Tennis Match Analysis	TVCG	Polk	TenniVis	edge case (high expertise)	<p>* Meanwhile, comparatively little work has been done on visualization of non-spatial data of tennis matches, such as score, point outcomes, point lengths and service information. Such data is easy to collect by non-professional players and carries both high level summaries and low level details about a match. Unfortunately, this data is usually analyzed in aggregated statistics and thus valuable insights about local details and trends are often missing. The above observation inspired us to build a tennis visualization system for non-professional players based on non-spatial data.</p> <p>* Non-professional tennis players and coaches have participated and provided important input to the development of TenniVis. First, the first author, who is also the developer of the system, has over 35 years of tennis playing experience. Second, a set of face-to-face meetings, phone interviews, and user studies have been conducted with non-professional tennis coaches. The coaches confirmed the feasibility of data collection for TenniVis. They also confirmed the usefulness of TenniVis in two pilot user studies where matches of their own players were analyzed.</p>	Goals2Tasks	sports	Authors mentioned that comparatively little work has been done on visualization of non-spatial data of tennis matches which motivated them to build a tennis visualization system for non-professional players.
17	2013	Variant View: Visualizing Sequence Variants in their Gene Context	TVCG	Ferstay	VariantView	no	<p>* Scientists are interested in finding sequence variants that are predictive of different disease states, and they do so by comparing the genome sequences of individuals diagnosed with a disease to the reference genome, which is generally assumed to be healthy and disease-free.</p> <p>* Currently, variant analysts attack the problem with workflows that have high cognitive load because of the need to mentally in- tegrate across many databases and spreadsheets.</p> <p>* In this design study, we worked with four variant analysts over a six month period to design and refine Variant View, a tool to accelerate and improve variant analysis</p> <p>* We did indeed have an extensive winnowing stage of roughly five months, in which we considered several other biological problems of potential collabo- rators at the Michael Smith Genome Sciences Centre (GSC) but de- cided against pursuing them. We ultimately selected the problem of variant analysis as a rich problem domain with interesting visualiza- tion research questions after a series of meetings with two front-line analysts (A1 and A2) who are research biologists.</p>	Goals2Tasks		
18	2016	Vials: Visualizing Alternative Splicing of Genes	TVCG	Strobel	Vials	no	<p>* Vials was developed in a user-centered design process over the course of ten months involving the scientific data analysis team of a major pharmaceutical company. Two of the authors of this paper are also members of that team. The development of Vials was triggered by their need to make sense of large amounts of alternative splicing data and their frustration with state of the art tools.</p> <p>* Based on interviews with our collaborators we identified two types of goals: finding biologically relevant insights in the data, and check- ing the quality and correctness of the data to establish trust.</p>	Goals2Tasks		
19	2016	Visually Comparing Weather Features in Forecasts	TVCG	Quinan	Weaver	no	<p>* Meteorologists working in these domains make predictions based on numerically simulated forecasts, the outputs of which include many different variables and time points.</p> <p>* The challenge for the meteorologists who use these visualizations is that these tools and third-party organizations produce visualizations with vastly different visual conventions, many of which go against well-known visualization principles, and seldom offer support for exploring the uncertainty in the simulations.</p> <p>* To better understand these challenges, we conducted a two-year design study that involved meteorologists in decision-making contexts across a variety of application areas ranging from wildfire prediction to air quality assessment.</p> <p>* We began with a series of contextual interviews where we observed the daily workflows of several of our collaborators. These formative interviews shaped our initial domain problem characterization.</p>	Goals2Tasks		

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20	2012	Facilitating Discourse Analysis with Interactive Visualization	TVCG	Zhao	DAViewer	no	<p>* We developed DAViewer using a user-centered process, starting by the identification of the particular domain problems and challenges from which we derived design requirements for the visualization tool. In close collaboration with computational linguistics experts at every stage of the development, we implemented and iteratively refined a functional prototype to address our target users' needs.</p> <p>* In particular, linguists are interested in answering the following questions ...</p> <p>* We conducted this iterative process over a period of six weeks, using a small sample of the whole data provided by the external expert for testing.</p>	Goals2Tasks		
21	2013	Understanding Interfirm Relationships in Business Ecosystems with Interactive Visualization	TVCG	Basole	DotInk360	edge case	<p>* We selected perhaps the most dynamic and rapidly evolving industry today, the mobile ecosystem [7], as our initial focus domain.</p> <p>* Our research began with a field study of analysts and we established a set of design requirements based on our findings.</p> <p>* Our system draws on the industry's two foremost data sources for the analysis of interfirm relationship structure and performance: Thomson Reuters SDC Platinum and Capital IQ Compustat.</p> <p>* In order to better understand the requirements and desirability of an analysis tool for the mobile industry ecosystem, we conducted an indepth field study</p>	Goals2Tasks Extended	interfirm relations	Two large datasets of interfirm relationships available and existing tools for analyzing interfirm activities are very limited.
22	2015	Matches, Mismatches, and Methods: Multiple-View Workflows for Energy Portfolio Analysis	TVCG	Brehmer	Energy Manager	no	<p>Our collaborators' goal was to deploy a redesigned version of Energy Manager, their energy analysis software tool; in doing so, they hoped to retain their existing client base encompassing thousands of organizations, attract new clients, and increase engagement with their software. Meanwhile, our goal as researchers was to successfully integrate our research process into our collaborators' software development practice.</p>	Goals2Tasks Extended		
23	2009	FromDaDy: Spreading Aircraft Trajectories Across Views to Support Iterative Queries	TVCG	Hurter	FromDaDy	no	<p>* FromDaDy has been used by engineers and Air Traffic Controllers. During this qualitative evaluation we observe how they took advantage of FromDaDy's assets: the spreading of trajectories across views, the extended features of the pick/drop paradigm...</p> <p>* This first scenario illustrates how users can explore a dataset and interactively refine their visual queries. The second scenario is a real case, where FromDaDy was used to extract trajectories for a training simulator for Air Traffic Controllers.</p>	Goals2Tasks Extended		
24	2010	GeneaQuilts: A System for Exploring Large Genealogies	TVCG	Bezerianos	GeneaQuilts	edge case	<p>* This is reflected in the large number of commercial and free genealogical software packages available</p> <p>* We compiled a list of basic analysis tasks, collected from three extensive interviews with 8 users involved in genealogy research.</p> <p>* The three anthropologists and four historians who took part in our initial extended interviews (Sec. 2.2) were later presented with GeneaQuilts and provided us with preliminary feedback and use cases.</p> <p>* We implemented GeneaQuilts as a component of a larger prototype system aimed at genealogy exploration, with interaction techniques, like Bring & Slide and filtering, designed for rapid navigation in large datasets. Our system was very positively received by domain experts, and was shown to support a large number of genealogy research tasks identified through extended interviews.</p>	Goals2Tasks Extended	genealogy databases	Genealogical databases can easily reach thousands of nodes and require a more scalable visualization solution.
25	2009	GeneShelf: A Web-based Visual Interface for Large Gene Expression Time-Series Data Repositories	TVCG	Kim	GeneShelf	edge case (self-use)	<p>* As public repositories with a large body of gene chip datasets become popular, there is a growing need for efficient interfaces to help users explore the datasets in the repositories.</p> <p>* We believe a lightweight visual web interface to show each project can significantly increase the utility of current public microarray data repositories.</p> <p>* We performed a case study and a preliminary qualitative user study at a microarray research lab to show the utility and usability of GeneShelf.</p> <p>* To validate and improve our interface design, an author of this paper who is a neuroscientist conducted a case study by trying GeneShelf herself.</p>	Goals2Tasks Extended	gene chip datasets	"As public repositories with a large body of gene chip datasets become popular, there is a growing need for efficient interfaces to help users explore the datasets in the repositories."
26	2013	Evaluation of Filesystem Provenance Visualization Tools	TVCG	Borkin	InProv	no	<p>* In collaboration with the PASS (Provenance-Aware Storage System) group at Harvard University, we set out to develop a new visualization tool to enable easy and effective exploration of filesystem provenance data.</p> <p>* We tested InProv on output from PASS, a "provenance-aware storage system" created by the Systems Research Group...</p>	Goals2Tasks Extended		
27	2010	The Streams of Our Lives: Visualizing Listening Histories in Context	TVCG	Baur	LastHistory	edge case	<p>* The by-products of this process, the recorded listening histories, are meticulous representations of one's music consumption and already have become the actual reason for many people to use Last.fm. They can, however, quickly span tens of thousands of songs and become too complex to be understood from the chronological lists that Last.fm provides.</p> <p>* A large number of fan-created static visualizations and analytic tools are therefore available that range from timelines displaying the number of logged songs...</p> <p>* We believe that a 'casual information visualization' approach can prove valuable for making this personal information available to their creators.</p> <p>* LastHistory has been evaluated in a lab study and made available online. We discussed the results of these evaluations and the positive reception of the tool by real-world users</p>	Goals2Tasks Extended	listening histories	Listening histories have become the reason for many people to use Last.fm but existing tools/techniques are not appropriate for exploring tens of thousands of songs.
28	2014	Interactively Visualizing a Large Manufacturing Schedule	TVCG	Jo	LiveGantt	no	<p>* After investigating those methods and major commercial schedule visualization tools recommended by researchers with years of experience in manufacture scheduling, we identified the following three main challenges.</p> <p>* We had a regular meeting with three industrial engineering researchers at least once every two weeks for six months with each meeting lasting about two hours. The researchers have worked with practitioners of manufacturing scheduling in large factories for many years to develop efficient scheduling algorithms.</p>	Goals2Tasks Extended		
29	2012	Living Liquid: Design and Evaluation of an Exploratory Visualization Tool for Museum Visitors	TVCG	Ma	Living Liquid	no	<p>* Living Liquid is an exhibit prototype developed at the Exploratorium, in collaboration with the Visualization Interface and Design Innovation (VIDI) group at the University of California, Davis, and the Center for Microbial Oceanography Research and Education.</p> <p>* As part of their work, the Darwin Project has generated a set of movies visualizing several aspects of the dataset [43], which provided a starting point for the Living Liquid exhibit.</p>	Goals2Tasks Extended		
30	2009	MizBee: A Multiscale Synteny Browser	TVCG	Meyer	MizBee	no	<p>* We gathered the raw data for this characterization by conducting a series of interviews with two target users, biologists who use conserved syntenic datasets as part of their analysis process.</p> <p>* We demonstrate the capabilities of MizBee on two datasets, one from each of our target user collaborators, both of whom are active research scientists.</p>	Goals2Tasks Extended		

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31	2010	OpinionSeer: Interactive Visualization of Hotel Customer Feedback	TVCG	Wu	OpinionSeer	edge case	<p>* In this study, we focus on the visual analysis of online hotel customer feedback. Hotel customers are mostly tourists with diverse cultural backgrounds, coming from different countries.</p> <p>* We design and develop OpinionSeer to address the need to effectively communicate opinion-mining results and facilitate the analytical reasoning process.</p> <p>* OpinionSeer has two possible uses. Hospitality researchers can use it as a general analysis tool to analyze and detect hidden patterns in raw text data, and provide a user-friendly visual presentation to end users such as hotel managers. For hotel managers, the system allows them to identify useful and meaningful relationships quickly among vast amounts of textual data uploaded by customers...</p> <p>* Thus, hotel customer reviews from TripAdvisor are selected as our data samples for our system. The data we obtained from TripAdvisor can be divided into three parts: hotel data, customer data, and review data</p> <p>* Through a series of interviews with our target users, we found that hospitality researchers usually study opinion relationships, such as the relationship of opinions and the service category, as well as the hidden patterns related to customers' cultural background. Hotel managers, on the other hand, need to know customer opinions in a short time to take timely actions.</p>	Goals2Tasks Extended	hotel customer reviews	There is a growing need to extract and analyze customer opinions from large collections of online customer reviews.
32	2012	RelEx: Visualization for Actively Changing Overlay Network Specifications	TVCG	Sedlmair	RelEx	no	* the result of a 9-month collaboration with German automotive engineers at BMW tasked with specifying and optimizing the communication within in-car networks	Goals2Tasks Extended		
33	2011	Sequence Surveyor: Leveraging Overview for Scalable Genomic Alignment Visualization	TVCG	Albers	Sequence Surveyor	no	The data used in this paper comes from four groups of domain scientists: evolutionary biologists, a systems biologist, a yeast biologist, and a bioinformatician. All four groups have large genome alignment data that they want to explore, but no analysis tools to support that exploration.	Goals2Tasks Extended		
34	2015	Speculative Practices: Utilizing InfoVis to Explore Untapped Literary Collections	TVCG	Hinrichs	Speculative Practices	edge case (high expertise)	<p>* Our interdisciplinary research is grounded in a wide, and largely untapped, literary collection, The Bob Gibson Collection of Speculative Fiction, compiled by the Canadian collector and avid science fiction fan Bob Gibson (1908–2001).</p> <p>* Through our interdisciplinary process of designing a visualization that would adequately represent the Gibson Anthologies for literary analysis and public exploration, we discovered unique constraints and productive tensions in this context that InfoVis has to address.</p> <p>* Literary collections are of interest to both academic and non-academic audiences. The same work of literature can be approached for pleasure by general interest readers, fans, and other non-academic experts, as well as by academic scholars who examine the ways in which literature reflects on and actively structures human history and society.</p>	Goals2Tasks Extended	literary collection	The research project is based on a wide and largely untapped literary collection
35	2012	The DeepTree Exhibit: Visualizing the Tree of Life to Facilitate Informal Learning	TVCG	Block	DeepTree	no	<p>* The project is multi-disciplinary, consisting of two computer scientists, one learning scientist, two cognitive developmental psychologists, one museum curator, and five external science advisors.</p> <p>* The requirements for the DeepTree exhibit are to create a collaborative (R1) and interactive (R2) exhibit that uses a visualization of the Tree of Life (R3) as a platform to help the wider public to learn about evolution (R4).</p>	Goals2Tasks Extended		
36	2015	TimeSpan: Using Visualization to Explore Temporal Multi-dimensional Data of Stroke Patients	TVCG	Loorak	TimeSpan	no	We are working with a group of stroke professionals who are studying clinically acquired temporal stroke treatment data to better understand the varying time spans in DTN. Understanding the factors that contribute to these delays needs careful examination and analysis of the temporal multivariate data.	Goals2Tasks Extended		
37	2015	Visual Mementos: Reflecting Memories with Personal Data	TVCG	Thudt	Visual Mementos	edge case	<p>* Today a large variety of tools support digital capture of different aspects of people's lives. However, the temptation to capture as much as possible results in vast collections scattered over disparate sources. This huge amount of data can lead to an emotional alienation from digital collections and complicate people's construction of meaning and connection to their past.</p> <p>* Our goal was to build a tool that provides a means for people to reflect on their trips and share their experiences with their friends and loved ones.</p> <p>* To elicit people's contextual feedback and subjective experience we employed a technology probe, which enabled people to build visual mementos based on their personal movement data.</p>	Goals2Tasks Extended	personal movement data	People collect huge amount of personal movement data but it is difficult to explore or share personal experiences.
38	2015	Visualization, Selection, and Analysis of Traffic Flows	TVCG	Scheepens	Traffic Flows	no	<p>* Our approach is intended for analysts that want to investigate traffic flows. In our design we are mainly inspired by air traffic analysts. These analysts perform traffic flow analysis and are mostly air traffic controllers with extensive knowledge of existing flight rules and the structure of the airspace.</p> <p>* Based on discussions with air traffic analysts, we have formulated the following requirements for our approach</p>	Goals2Tasks Extended		
39	2008	LiveRAC: Interactive Visual Exploration of System Management Time-Series Data	CHI	McLachlan	LiveRAC	no	<p>* However, understanding large collections of timeseries data remains difficult. We selected large-scale system management as a domain where people need to understand large sets of time-series data at multiple levels of detail, and with respect to frequently changing groupings</p> <p>* We gathered requirements, then built and obtained feedback on a series of prototypes. We started with paper prototypes, continued to a proof-of-concept interactive software prototype using synthetic data, then to a high-fidelity prototype running on real data, and finally to a deployable system.</p> <p>* Each working prototype increased credibility for the project, leading to buy-in from the next group within the organization that had closer access to production data and real users. In each succeeding phase, we were able to work with a larger pool of participants closer to the target user group, culminating in direct contact with system management practitioners, the LCEs. We gathered additional requirements at each stage.</p>	Design Study Contributions Come in Different Guises		
40	2012	Overview: The design, adoption, and analysis of a visual document mining tool for investigative journalists.	TVCG	Brehmer	Overview	no	* The Overview project began in December 2010, when Associated Press journalist and co-author Stray visualized a subset (11,616 of 391,832) of the WikiLeaks Iraq War Logs	Design Study Contributions Come in Different Guises		
41	1999	Cluster and Calendar based Visualization of Time Series Data	InfoVis Symposium	Van Wijk	CalendarView	edge case	<p>* The background of our interest in time series data is the liberalization of the energy markets.</p> <p>* Suppose, we have collected energy consumption or air pollution data at short time intervals during one year, then how can we extract information from these data?</p>	Design Study Contributions Come in Different Guises	electricity consumption patterns	Interest in specific data type (energy consumption, air pollution data) and how to visualize effectively

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42	2011	Evaluation of Artery Visualizations for Heart Disease Diagnosis	TVCG	Borkin	HemoVis	no	* In collaboration with doctors and researchers in cardiovascular imaging and applied physics, we set out to investigate the effectiveness of different visualization strategies for this problem.	Design Study Contributions Come in Different Guises		
43	2011	Visual Readability Analysis: How to Make Your Writings Easier to Read	TVCG	Oelke	VisRA	no	* What we end up with is a tool that supports the writer in the task of revising a text. After loading a text, our tool VisRA gives the user detailed feedback about passages and sentences that may be difficult to read and understand. * We also used the tool to revise our own paper. Because the target group of our paper is the visual analytics community, the wordlist that is necessary for the feature vocabulary difficulty was compiled of the VAST and InfoVis papers of previous years.	Design Study Contributions Come in Different Guises		
44	2016	Urban pulse: Capturing the rhythm of cities	TVCG	Miranda	UrbanPulse	edge case	* Technological innovations have enabled the automatic collection of a diverse set of data about our daily lives both as individuals and as a society. As a consequence, cities are not only collecting, but also making unique data sets available through open data portals and live feeds * Our goal in this work is to understand the city in the context of the different data sets, inspired by the theory propagated by Park and Burgess in their seminal work The City * Working in collaboration with domain experts, we demonstrate the utility of the urban pulse framework through multiple case studies	opportunistic	Flickr data (urban)	The goal of the authors is to use data sets that are made available to better understand dynamics within cities.
45	2019	Sabrina: Modeling and Visualization of Financial Data over Time with Incremental Domain Knowledge	VIS Short Paper	Arleo	Sabrina	edge case	* Investment planning requires knowledge of the financial landscape on a large scale, both in terms of geo-spatial and industry sector distribution. There is plenty of data available, but it is scattered across heterogeneous sources (newspapers, open data, etc.), which makes it difficult for financial analysts to understand the big picture * We invited three experts from the Austrian Chamber of Commerce for a two-hour discussion. The experts were enrolled in the validation because of their interest in Sabrina and their compatibility with the scope of the project.	opportunistic	financial transaction flows	"There is plenty of [financial] data available, but it is scattered across heterogeneous sources (newspapers, open data, etc.), which makes it difficult for financial analysts to understand the big picture"
46	2014	Moving beyond sequential design: Reflections on a rich multi-channel approach to data visualization	TVCG	Wood	MultiChannel	edge case	* Our focus is on a large dataset that contains personal information about individuals and their spatio-temporal travel behaviors. * A key characteristic of the scheme that offers opportunities for analysis and visual exploration is the detailed digital record of its use. Three datasets in particular have been central to the visualization and analysis opportunities offered by the scheme. Firstly,	opportunistic	bike sharing data	Motivation may origin from availability of spatio-temporal travel data: "Very large and rapid increases in the availability, scope and precision of such data has brought many new opportunities for researchers working within the social and behavioral sciences"
47	2018	IDMVis: Temporal event sequence visualization for type 1 diabetes treatment decision support	TVCG	Zhang	IDMVis	no	* We iteratively designed IDMVis over 18 months with periodic consultation from the same CDE, dietitian, and endocrinologist we interviewed to create the initial hierarchical task abstraction * We identified design requirements based on the informal qualitative user study with clinicians and abstractions discussed above	vispubdata		
48	2009	code_swarm: A design study in organic software visualization	TVCG	Ogawa	code_swarm	edge case (self use)	* We created code swarm to explore this data using the technique of organic information visualization. * We wanted code swarm to be applicable to all open source software projects. Therefore, we chose to use data from a source they all have in common: source control repositories. * Finally, we made the project open source so that the software community would be able to use it to create their own visualizations.	vispubdata	code repositories	Enormous and continuously growing number of open source code repositories are published. The authors created code_swarm to explore this data, which started as a simple experimental program.
49	2018	A framework for externalizing implicit error using visualization	TVCG	McCurdy	Zika	no	Experts working to assess and suppress the spread of diseases like Zika rely on two sources of information: outbreak data that track the spread of the virus across a region, coupled with information about the demography and geography of the region; and response data that describe international response efforts underway. Using these data, experts seek to understand how an outbreak is spreading across regions, assess the risk and relative impact of the outbreak on underlying populations, and understand how these risk and impact factors change over time.	vispubdata		
50	2018	Lineage: Visualizing multivariate clinical data in genealogy graphs	TVCG	Nobre	Lineage	no	* we present a novel genealogy visualization tool that we have developed in collaboration with psychiatrists and geneticists studying the genetic underpinnings and the environmental factors of suicide and autism. * Our collaborators study the genetic underpinnings and the environmental factors influencing psychiatric conditions, such as autism and suicide, using detailed genealogical, clinical, and genetic data. * Our collaborators have compiled a unique dataset of suicide cases, including DNA and clinical profiles on 4,017 cases.	opportunistic		
51	2013	Creative User-Centered Visualization Design for Energy Analysts and Modelers	TVCG	Goodwin	Smart Meter	edge case	Our research with data analysts from a major UK energy supplier begins to investigate the benefits that data visualization can bring to derive value from the data emerging from Smart Home technologies and opens up opportunities for further research.	opportunistic	electricity consumption	One of the key motivations was to explore how information visualization can be used to dervie value from smart meter data.
52	2013	Visual Analytics for Multimodal Social Network Analysis: A Design Study with Social Scientists	TVCG	Ghani	mSNA	no	* In this paper, we present a design study on the use of visual analytics to aid social scientists in conducting multimodal social network analysis (mSNA). * The early design process consisted of brainstorming, sketching (Figure 1), and reviewing existing work in the domain. We built an early prototype with a sample data set (NSF funding award data), so that A3 could make sense of the effectiveness of visual analytics. Based on A3's input, this low-fidelity prototype was a compound node-link diagram with color-coding to convey mode information.	vispubdata		
53	2018	DQNviz: A Visual Analytics Approach to Understand Deep Q-Networks Screen reader support enabled.	TVCG	Wang	DQNViz	no	In this work, we propose DQNViz, a visual analytics system to understand, diagnose, and potentially improve DQN models. DQNViz helps domain experts understand the experiences of a DQN agent at four different levels through visualization.	vispubdata		
54	2012	AlVis: Situation awareness in the surveillance of road tunnels	TVCG	Piringer	AlVis	no	The approach deccribed in this paper is the result of a tight collaboration with a company providing equipment for a video-based surveillance of road tunnels. For two years, we have been in permanent contact with experts in building and operating tunnels. As a first step, we identified the subsequent list of tasks of tunnel operators	vispubdata		
55	2013	MotionExplorer	TVCG	Bernard	MotionExplorer	no	We developed MotionExplorer in collaboration with domain experts, who provided the data set and defined the analytical challenges in their research workflow.	vispubdata		

#	YEAR	TITLE	VENUE	1st AUTHOR	ID	DATA-FIRST	EXCERPTS	SEED	DOMAIN / DATA	REASON FOR SELECTING AS EDGE CASE
56	2014	DIA2: Web-based Cyberinfrastructure for Visual Analysis of Funding Portfolios	TVCG	Madhavan	DIA2	no	<p>* The design process started with gathering in-depth information in order to create personas of users inside the National Science Foundation. We attempted to understand not only their daily tasks and needs, but also higher level goals, as recommended in [9].</p> <p>* As we approached this project, our focus was on gaining a solid understanding of users' goals, needs and workflows, which would help us identify their mental models of working with data and reports. We went into the design project with a "blank slate" attitude ready to learn as much as we could about our users before creating any solutions.</p>	vispubdata		
57	2016	VisOHC	TVCG	Kwon	VisOHC	no	In this study, we aimed to investigate visual analytic solutions for OHC administrators by conducting a design study. Our design study, which included interviews with two administrators of two different OHCs, elicited the goals and tasks of the OHC administrators. During the study process, we designed and developed a visual analytics application, called "VisOHC," using a real data set of an OHC.	vispubdata		
58	2015	LiteVis: Integrated Visualization for Simulation-Based Decision Support in Lighting Design	TVCG	Sorger	LiteVis	no	...we conducted a design study in collaboration with lighting design experts. The result is LiteVis, a system for the efficient decision support in lighting design.	vispubdata		
59	2017	Visual Analytics of MOOC Forums	TVCG	Fu	iForum	no	To fill this gap, in this paper, we conduct a design study that involves three instructional staff in MOOCs to develop a visual analytic system, called iForum, allowing for effective discovery and understanding of dynamic patterns in course forums. We elicit domain-specific questions and tasks through multiple interviews, and design the system in a user-centered iterative approach using real datasets.	vispubdata		
60	2016	EventAction: Visual analytics for	TVCG	Du	EventAction	no	A design study of EventAction, which instantiates the proposed workflow in the context of a student advising application, and reports on an evaluation conducted with a student review manager and three graduate students.	vispubdata		
61	2017	How Do Ancestral Traits Shape Family Trees Over Generations?	TVCG	Fu	TreeEvo	no	<p>* To address the above challenges, we conduct a design study with social demographers and historians to explore visualization designs for analyzing the associations between individual traits of founding ancestors (e.g., life span) and the structure of family trees in later generations. We derive a set of analytical questions based on discussions and interviews with a group of six experts.</p> <p>* The goal of this study is to support social scientists in conducting multi-generational analysis. We closely collaborate with six domain experts through the design, development, and evaluation of TreeEvo. One expert is a demographer and our internal expert (a co-author of this paper).</p>	vispubdata		
62	2017	Understanding a Sequence of Sequences: Visual Exploration of Categorical States in Lake Sediment Cores	TVCG	Unger	Lake Sediment	no	This design study was conducted in close collaboration between researchers from visualization and geoscience. An expert for microfacies analysis co-authored the paper. She accompanied the scientific process, which comprised gaining an initial understanding of the geoscientific question (Sec. 2) and the analytical procedure with the main tasks (Sec. 3), the conceptual development (Sec. 5) and its realization with specific methods (Sec. 6 and 7).	vispubdata		
63	2018	Visualizing Dataflow graphs	TVCG	Wongsuphasawat	Dataflow Graphs	no	<p>* In response, we present the TensorFlow Graph Visualizer, a component of in the TensorFlow machine intelligence platform, to help developers understand and inspect the structure of their TensorFlow models.</p> <p>* Our overarching design goal is to help developers understand and communicate the structures of TensorFlow models, which can be useful in many scenarios. Based on conversations with potential users, we identified a set of key scenarios for a model visualization.</p>	vispubdata		
64	2019	RetainVis: Visual Analytics with Interpretable and Interactive Recurrent Neural Networks on Electronic Medical Records	TVCG	Kwon	RetainVis	no	Our design study involved iterative design, assessment, and discussion activities between medical experts, artificial intelligence scientists, and visual analytics researchers. After we characterized users' tasks, we designed, implemented, and evaluated a visual analytics tool called RetainVis with an interactive, interpretable RNN-based model that we name RetainEX in order to fulfill the users' needs.	vispubdata		