

Computer Science Research Afternoon: Well Sorted Materials

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For an online, interactive version of the visualisations in this document, go here:

www.well-sorted.org/output/ComputerScienceResearchAfternoon

Introduction

Dear participant,

Thank you for taking part in submitting and sorting your ideas.

This document contains several visualisations of your ideas, grouped by the average of your online sorts. They are:

Dendrogram - This tree shows each submitted idea and its similarity to the others. The lower two ideas 'join' the more people grouped those two ideas together. For example, if two ideas join at the bottom, every person grouped those two together.

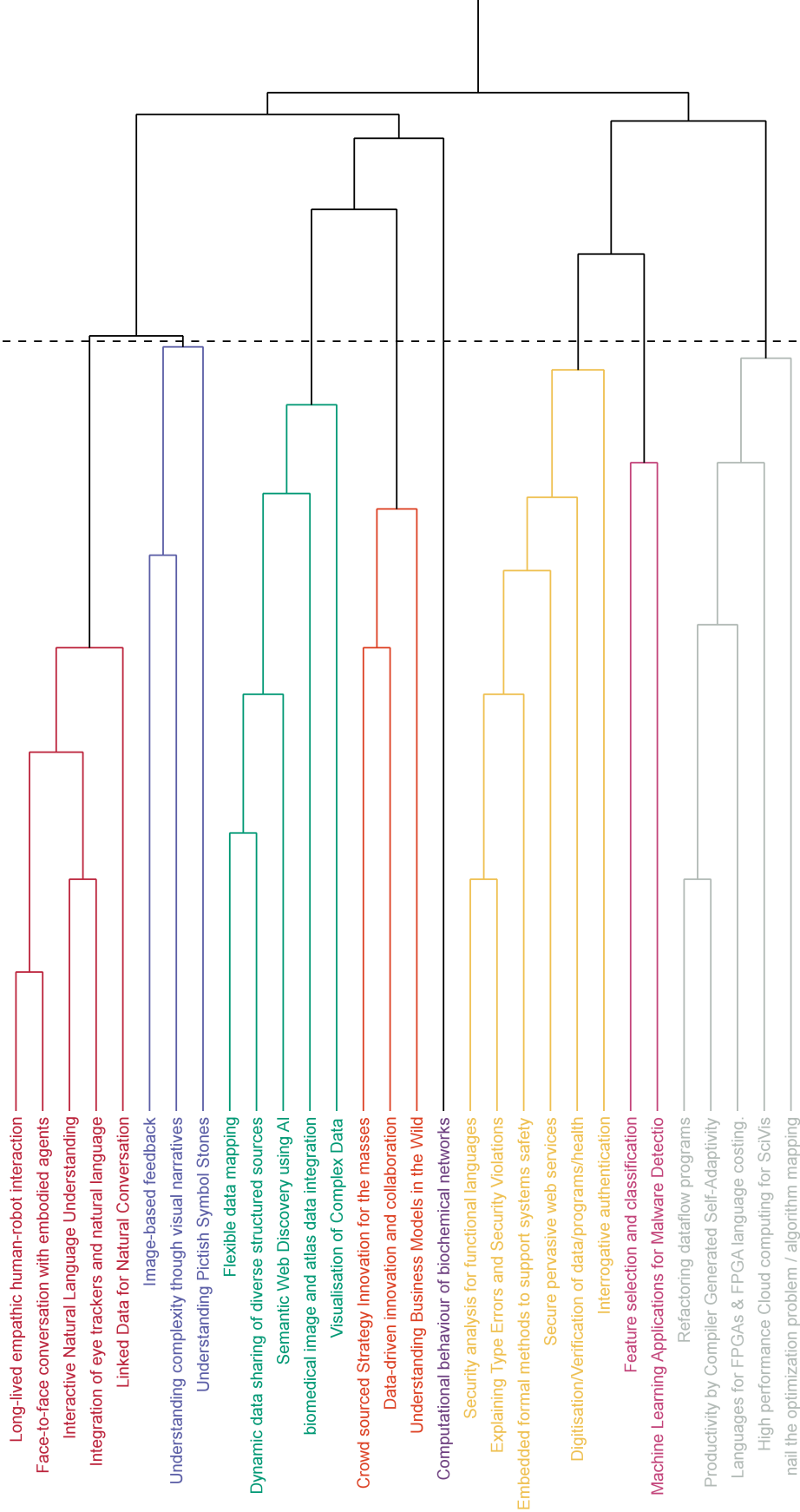
Tree Map - This visualisation presents an 'average' grouping. It is calculated by 'cutting' the Dendrogram at the dashed line so that any items which join lower than that line are placed in the same group. In addition, rectangles which share a side of the same length are more similar to each other than their peers.

Heat Map - This visualisation shows a similarity matrix where each idea is given a colour at the intersection with another idea, showing how similar the two are. This is useful to see how well formed a group is. The more red there is in a group (shown by the black lines), the more similar the ideas inside it were judged to be.

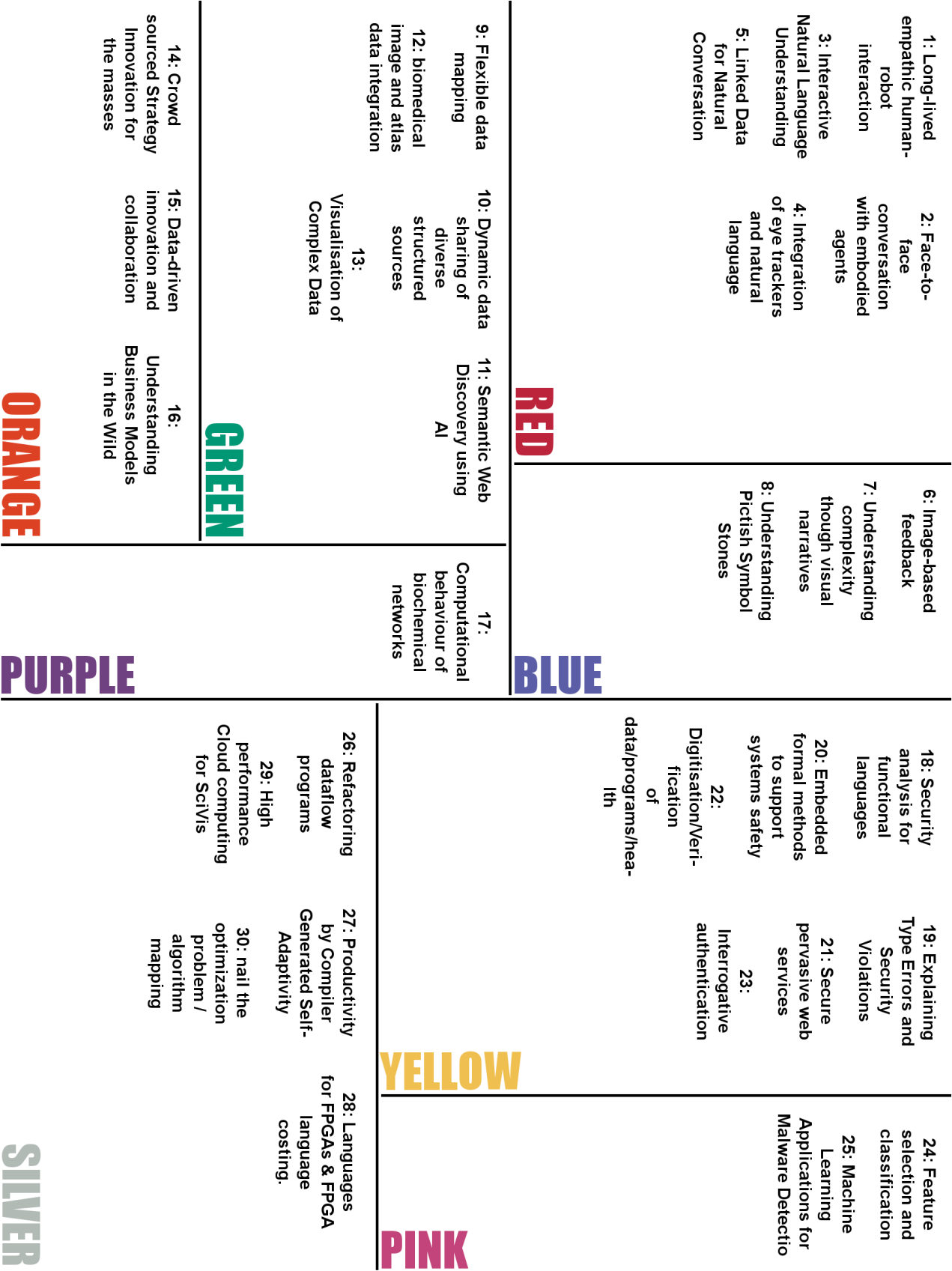
Raw Group Data - This table shows every submitted idea and its longer description. They are shown in the same order as the Dendrogram (so similar ideas are close to each other) and split into the coloured groups used in the Tree Map. In addition, each idea has been given a unique number so they are easier to find.



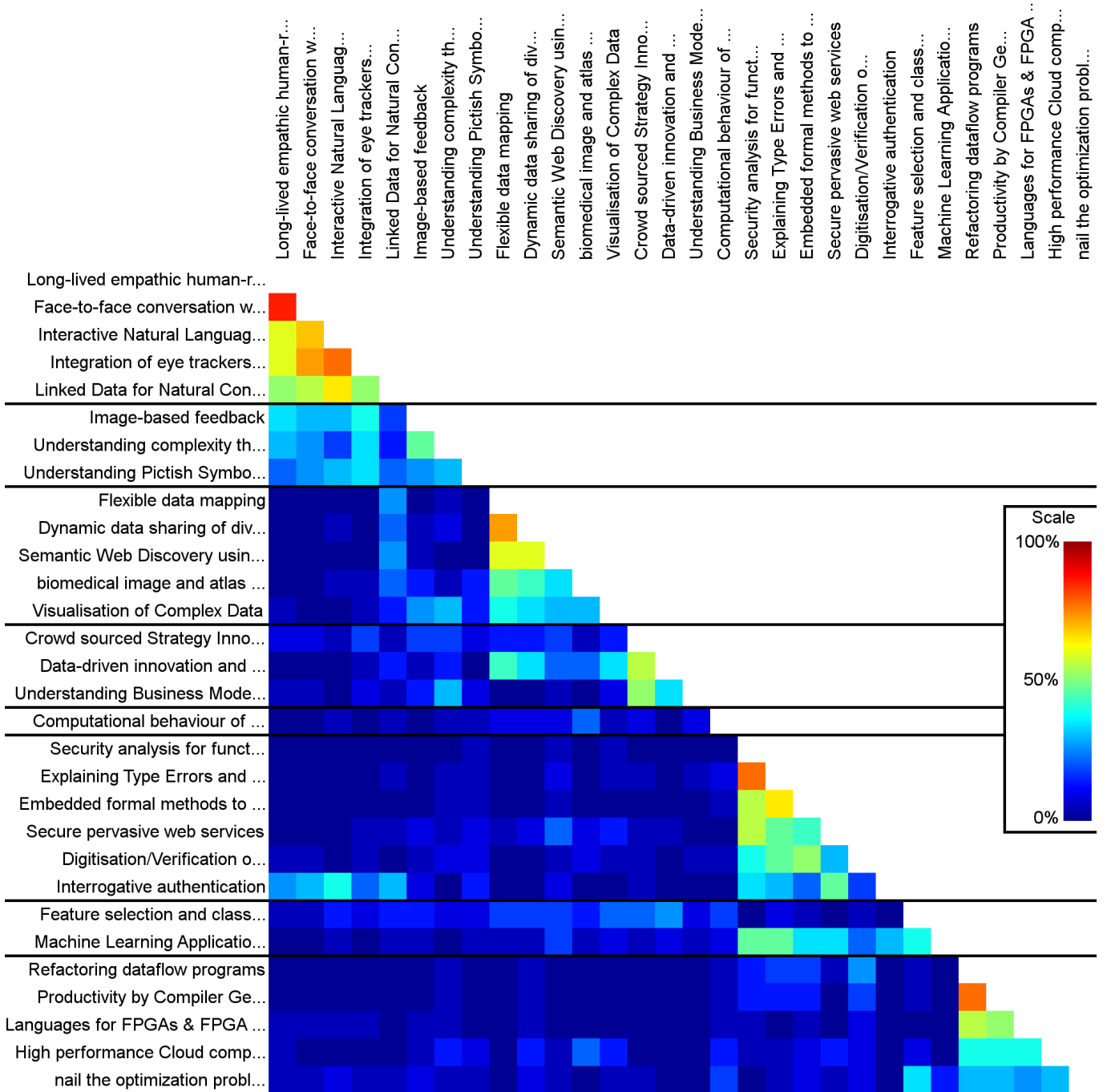
Dendrogram



Tree Map



Heat Map



Raw Group Data

Colour	#	Title	Description
Red	1	Long-lived empathic human-robot interaction	This involves a whole set of issues: more accurate sensing of user state; better robot cognitive/affective architectures; appropriate expressive behaviour; long-term human-like interaction memory (including forgetting); migration between embodiments
	2	Face-to-face conversation with embodied agents	Developing embodied conversational agents -- robots and virtual (animated) characters -- that are able to engage in natural face-to-face conversation with human partners
	3	Interactive Natural Language Understanding	Enabling interactive systems to learn the meaning of words in natural languages - i.e. learning semantics via interaction. This involves combining perceptual grounding with distributional and logical semantics, in a interactive multimodal system.
	4	Integration of eye trackers and natural language	Integration of eye trackers and natural language to assist decision making and drive interaction.
	5	Linked Data for Natural Conversation	Intelligent agents with the ability to have a natural language conversation is a recent hot trend in the tech world. A global database of facts and ontologies such as Linked Data could be used to improve their natural language conversational capabilities.

Colour	#	Title	Description
Blue	6	Image-based feedback	The use of images as a response format to access the emotional reactions of a crowd to an idea, presentation or product. New challenges include a) engagement of the crowd b) evaluating data to structure image browsers and summarise crowd image choices.
	7	Understanding complexity through visual narratives	The rich picture is a collaborative drawing tool used to investigate human activity in system design. This research explores the benefits of the tool in various community engagement situations focussing on the therapy and cultural use of visual narratives
	8	Understanding Pictish Symbol Stones	Some stones have Pictish symbols and also Ogham script. The Ogham alphabet was much used to record Primitive Irish. The stones with both inscriptions might provide the equivalent of a Rosetta Stone for interpreting Pictish symbols.

Colour	#	Title	Description
Green	9	Flexible data mapping	Enable multiple mappings between data sets based on different equivalence assumptions, e.g. matching on different properties. Users should then be able to select the appropriate mapping for different usage scenarios.
	10	Dynamic data sharing of diverse structured sources	Developing and extending structured matching techniques to allow data from disparate sources to be made dynamically interoperable. Allowing data users to guide and assess such matching and incorporating trust and provenance measures.
	11	Semantic Web Discovery using AI	The Web of Linked Data is full of useful and inspiring material, presented in an assortment of formats. The Semantic Web creates structure which allows rule-based and semantic reasoning, supporting discovery that can be tailored to varying users' needs.
	12	biomedical image and atlas data integration	Using biomedical atlases and semantics-based technologies for the integration of large image data sets (big data) in the context of the Life Sciences and eHealth.
	13	Visualisation of Complex Data	One of the biggest problems with the amount and variety of data we can collect these days (skipping over the privacy and ethics issues) is how do we visualise it in a simple, but meaningful way to users, to help them make sense of it?

Colour	#	Title	Description
Orange	14	Crowd sourced Strategy Innovation for the masses	The UK innovates its national research programmes by consultation with small groups (town hall meetings, strategy teams, strategic universities ..). We wish to use crowd-sourcing and data mining to open this up to many 100s/1000s of stakeholders.
	15	Data-driven innovation and collaboration	The idea is to combine data analysis, collective intelligence and visualisations with the aim to improve innovation and collaboration at various levels of an organisation.
	16	Understanding Business Models in the Wild	The use of innovative business models and development and deployment of innovative technologies are seen as one of the keys for economy growth. I would therefore like to be able to collect, describe and understand business models, via automated methods.

Colour	#	Title	Description
Purple	17	Computational behaviour of biochemical networks	Understand and model the computational behaviour of biochemical networks, both in silico and in a synthetic biology context. Investigate their potential uses for control and signal processing applications, particularly within the biomedical domain.

Colour	#	Title	Description
Yellow	18	Security analysis for functional languages	Combining static and dynamic analysis for security assessment of software developed with functional languages. Using data flow analysis and memory management to strengthen data integrity and service availability.
	19	Explaining Type Errors and Security Violations	Type systems for programming and proof languages are used for static analysis of programs to predict faults and violations of declared abstractions and information flow security policies, but it is challenging to explain errors in an understandable way.
	20	Embedded formal methods to support systems safety	Investigate novel combinations of formal representation and reasoning techniques within the context of established informal industrial practices with the aim of developing automated techniques for speculating accident scenarios for complex control systems
	21	Secure pervasive web services	Modelling, verification and analysis of webservices
	22	Digitisation/Verification of data/programs/health	Stepwise Automated/interactive specification, digitisation, verification & correctness to detect errors, prove consistency, safety & termination using layers of Logics, Types, Rewriting. Complete syntax & semantics, efficient constraint solving.
	23	Interrogative authentication	To develop an interactive, interrogative system that authenticates a person with a series of natural language questions and answers. The system's effectiveness will depend upon metrics such as time taken, number of questions asked, security and usability.

Colour	#	Title	Description
Pink	24	Feature selection and classification	Feature selection and classification in predictive data mining using evolutionary algorithms with special attention to simple classifiers such as k-NN.
	25	Machine Learning Applications for Malware Detectio	Signature-based techniques used by anti-malware can neither detect variations of existing malware nor completely new malware. We will study how machine learning (ANN, SVM, etc.) can be used to detect malware, and classify them into subcategories.

Colour	#	Title	Description
Silver	26	Refactoring dataflow programs	To deploy the box calculus to refactor multi-process(or) programs in the CAL dataflow language driven to optimise resource costs.
	27	Productivity by Compiler Generated Self-Adaptivity	Writing codes for heterogeneous, parallel execution is very hard. The inherent complexity very negatively impacts programmer productivity. We will tackle this problem by employing advanced compiler technology that generates self-adapting codes.
	28	Languages for FPGAs & FPGA language costing.	I'm investigating programming language designs to efficiently target FPGAs. I'd also like to raise the level of reasoning about time and area costs to high level FPGA programming languages.
	29	High performance Cloud computing for SciVis	Cloud computing offers elasticity over the number of processors to use and provides huge core numbers in total. Traditional high-performance infrastructures are tailored for static configurations and can't adjust to elasticity. App: scientific visualisati
	30	nail the optimization problem / algorithm mapping	there is a 99.9999% unexplored space of optimization algorithms; there is an (at least) equally large space of optimization landscapes. How do we map (partial information about the) landscape to the correct choice of algorithm? I have some ideas...