Part B. Public progress report

B1. CRP progress and scientific highlights

1. The collaborative work

Some contributions involve several IPs, but they are listed only once.

IP1:
Skeletal structures:

- The triangulation axis of polygons has been defined and analyzed.
- The straight skeleton in 3D has been canonically defined and events have been characterized.

Triangulations:

- Triangulations with circular arcs have been considered. (joint work with IP2 and IP4).
- For triangular shapes, recognizing shape Delaunay triangulations is polynomial. For arbitrary shapes, there are indications that it is NP-hard: results on a closely related problem have been obtained with IP4, ComPoSe, and GraDR.
- Colorability of pseudo-triangulations (some polynomial and NP-completeness results, with ComPoSe)
- k-Convexity: Characterization of k-convexity of polygons and point sets in the plane (some Erdös-Szekeres-type results, and algorithms, with ComPoSe)

IP2:
Skeletal Structures:

- Topological Reeb graphs and Reeb spaces, which capture the basic structure of a Riemannian manifold based on one or two scalar-valued smooth functions defined on it. For a special choice of the defining function, we formulated an algorithm which computes the Reeb graph of a volume, using only its surface description.
- Medial Axis computation with respect to piecewise linear metrics (joint work with IP1).

AP3:

- A systematic study of several graph invariants of proximity graphs has been made.
- Applications of Voronoi diagrams to develop data structures that allow fast queries for separation or facility location problems have been developed.

IP4:
Voronoi diagrams for shape matching:

- The complexity of the partial-matching Voronoi diagram between two sets of m and n points is bounded by $O(m!(mn)^{const})$. Current work on improving the m! factor, involves an interesting connection to greedy matchings. (Joint work in progress, involving IP4 and GraDR).

IP5:
Abstract Voronoi Diagrams:

- Generalization of abstract Voronoi Diagrams to disconnected Voronoi regions (in preparation)
- k-th order abstract Voronoi Diagrams. We gave a complexity bound of 2k(n-k), which is asymptotically tight. (Joint work with IP7.)

Additively weighted Voronoi diagrams

- A simple proof that additively weighted Voronoi diagrams optimally solve the semi-discrete transportation problem for a large class of cost measures. (Cooperation with IP4.)

IP6:
Skeletal structures:

- generalized definition of the β-skeleton and an analysis of its different options. In particular, we have studied properties of β-skeletons defined for a set of segments. (Cooperation with IP7.)

Algorithmic work:

- deterministic algorithms finding β-skeletons for $2 < \beta$ and β-spectrum for $1 \leq \beta \leq 2$ in the L_p metrics for $p>1$.
- parallel algorithms in the CREW-PRAM model which find for $1 \leq \beta \leq 2$ the β-skeleton and the β-spectrum.

Conceptual work:

- generalized definition of β-skeleton and analysis of its properties in cases of general graphs and a set of objects (e.g. segments).

IP7:
Higher-order and farthest Voronoi diagrams:

- Properties of higher-order and farthest line segment Voronoi diagrams in the L_p metric. We showed that despite disconnected regions, the order-k line segment Voronoi diagram in L_2 has structural complexity $O(k(n-k))$, which is asymptotically tight. For points in the L_∞ (L_1) metric we showed this is $O(\min\{ k(n-k), (n-k)^2\})$. We also introduced the *farthest hull*, a closed curve that characterises the regions of the farthest line segment Voronoi diagram in L_p, which helps to derive a variety of simple algorithms for their construction.

Hausdorff Voronoi diagrams of clusters of objects:

- Randomized incremental construction of the Hausdorff Voronoi diagram of clusters of points with non-crossing convex hulls. Our best algorithm takes $O(n \log^2 n (\log \log n)^2)$ expected time and $O(n)$ worst-case space, improving on the best previous results. We also present a simpler $O(n \log^3 n)$-expected time, $O(n)$-expected space algorithm, by augmenting the Voronoi hierarchy with the ability to handle sites of non-constant complexity, sites that are not enclosed in their Voronoi regions, and empty Voronoi regions.
- A sufficient condition for the Hausdorff Voronoi diagram of clusters of line segments to have linear combinatorial complexity and connected regions.

Initiated work on making L_∞ Voronoi diagrams of polygons available in the software library CGAL, targeting VLSI applications.

2. Scientific highlights

The straight skeleton of a polygon is a geometric structure that has important applications. In the plane, it has a straightforward definition, but in space, for general (non-convex) polytopes in space, there was no consistent definition so far. It was known that ambiguities can arise, and it was not even clear that a structure with analogous properties as in the plane always exists. The straight skeleton in 3D has now been canonically defined; it can be computed as the (minimal volume) offset of polytopes in 3D. (IP1).

Reeb graphs form another important skeletal structure for shapes. We designed an algorithm for the Reeb graph of a 3D volume, which requires *only the boundary representation*. This algorithm has been implemented and tested, and it proved to be efficient for real-world examples. (IP2).

Abstract Voronoi diagrams have been generalized to disconnected Voronoi regions (paper in preparation) and to k-th order Voronoi diagrams (paper submitted). For the latter we gave a complexity bound of 2k(n-k) which is asymptotically tight. Such a bound was previously known only for points under L_p norms and for line segments under the L_2 Norm. (Joint work between IP5 and IP7).

We found a simple proof for the fact that additively weighted Voronoi diagrams optimally solve the semi-discrete transportation problem for a large class of cost measures. This is interesting in connection with the transportation metric (or earth-movers-distance or Wasserstein metric) between probability distributions, which is important for shape matching but has recently gained interest in other fields such as variational principles for dynamical systems (Joint work between IP4 and IP5).

We have initiated a thorough study of planar graph drawings that use circular arcs, as a means to improve the readability of graph drawings when the location of the vertices is fixed. For the case of triangulations, we gave algorithms for optimizing the smallest occurring angle without introducing crossings, while for more general graphs, this problem is still under investigation. (Joint work between IP1, IP2 and IP5.)

One major breakthrough has been achieved in close connection with the EuroGIGA Project, but not as part of EuroGIGA: Natan Rubin, who is associated to the group of IP4 at FU Berlin as a PostDoc since 2011, has made significant progress towards the longstanding open question of the number of changes of the Voronoi diagram of points moving on a line. Under the assumption that any four points can be co-circular at most twice, he has obtained a near-quadratic bound (Natan Rubin: On topological changes in the Delaunay triangulation of moving points. Symposium on Computational Geometry 2012: pp.1-10. This paper has won the best-paper award at our flagship conference.) He is currently extending his result to at most three cocircularities, which would cover the unit-speed case of the original problem. We hope that we can involve him in some future collaboration within the VORONOI project.

Most significant joint publications:

W. Aigner, F. Aurenhammer, and B. Jüttler.
On triangulation axes of polygons.
In: Proc. 28th European Workshop on Computational Geometry (EuroCG '2012), pages 125-128, Assisi, Italy, 2012

O. Aichholzer, F. Aurenhammer, E.D. Demaine, F. Hurtado, P. Ramos, and J. Urrutia.
On k-convex polygons.
Computational Geometry: Theory and Applications, 45:73-87, 2012.

O. Aichholzer, W. Aigner, F. Aurenhammer, K. Cech Dobiasova, B. Jüttler, and G. Rote.
Triangulations with circular arcs.
In: Proc. 19th Int. Symposium on Graph Drawing, Springer LNCS, volume 7034, pages 296-307, Eindhoven, Netherlands, 2012.

Cecilia Bohler, Panagiotis Cheilaris, Rolf Klein, Chih-Hung Liu, Evanthia Papadopoulou, Maksym Zavershynsky.
On the Complexity of Higher Order Abstract Voronoi Diagrams.
Submitted to a conference.

Darius Geiß, Rolf Klein, Rainer Penninger, and Günter Rote.
Optimally solving a transportation problem using Voronoi diagrams.
Computational Geometry: Theory and Applications (2012), to appear.

B.2. Integration of the CRP in the programme

1. Describe the contribution of your CRP to the EUROCORES programme. What is the place and role of the CRP in the framework of the programme? From a scientific perspective, how well integrated is your CRP in the programme? How would you describe the intensity of interaction between your CRP and other CRPs in the programme?

Collaboration between the four CRPs works very well. Naturally, the different IPs of VORONOI are connected to a different degree with other CRPs; some IPs, due to being located at the same site at a project of another CRP, play a more central role.

VORONOI is thematically most closely related to the sister-CRP ComPoSe: they share the same flagship conference (the *Annual Symposium on Computational Geometry*), although VORONOI is more leaning to geometric modelling with extensions to industrial applications, whereas ComPoSe is more mathematically oriented and founded in discrete geometry. Nevertheless, the collaboration between these fields is currently deepening within EUROGIGA, thanks to the first informal meeting in Assisi (March 2011) and the larger conference in Prague (July 2012). Similar, but weaker links exist to the CRP GraDR, and, to a lesser extent, to GreGAS.

VORONOI has stimulated research in the other CRPs (for example, about the algorithmic complexity of recognizing shape Delaunay triangulations, which has started to attract members of GraDR and ComPoSe, the combinatorial complexity of partial matching Voronoi diagrams, which involves members from GraDR), and some VORONOI members are also involved in research of the other fields.
The close link between VORONOI and ComPoSe will further manifest itself in the joint week-long workshop in Graz (July 2013).

2. Describe the benefit to your CRP of being part of the EUROCORES programme (e.g. achieving critical mass of expertise, scale and scope, visibility, collaborative opportunities, ideas, etc.).

The conferences that involve several CRPs are instrumental in initiating and facilitating international contacts, especially for young researchers of VORONOI. The instrument of short visits is becoming increasingly popular. IP4 could benefit from the expertise provided through a short visit from a GraDR member. IP7 will benefit from a short visit to a ComPoSe site.

Thanks to the EUROGIGA project, small and independent groups in new countries of the European Union (e.g. in Poland) have a possibility of cooperation with their bigger and more developed partners. There is also a valuable opportunity of joint work between young and more experienced researchers form different centers and broadening horizons as a result of joint analysis of different problems.

B.3. Cross-CRP networking, training and dissemination

1. Which networking/training/dissemination activities have you or your CRP members participated in? Indicate how many team members participated in each activity.

- EuroGIGA Kickoff Session at the Symposium on Computational Geometry, Paris, June 12, 2011.

  7 team members

- March 22, 2012: EuroGIGA session in connection with EuroCG, the European Workshop on Computational Geometry, March 19-21, 2012, Assisi (Italy)

  15 team members

- MidTermConference in Prague, Juli 9-13, 2012

  13 team members

- GraDR Fall School school on Graph- and Geo-Visualization, Würzburg October 8-12, 2012

  3 team members

2. **Networking activities.** Describe *the most important networking activity* for your CRP to date (in terms of impact, outcome, creation of synergy and cooperation within or outside the programme).

The VORONOI KickoffMeeting in Lugano, October 2011, has been instrumental to get the project going. It was the first time that all people from the CRP could exchange ideas.

In terms of sparking off collaboration also to other CRPs, the March 2012 EuroGIGA session in connection with EuroCG in Assisi was most important, and further collaborations were started during the Midterm Conference in Prague in July 2012.

3. **Dissemination activities.** Describe the *most valuable dissemination activity (or activities)* your team has undertaken so far, with respect to (i) the scientific community and (ii) the wider public. Describe the outcome and impact of these activities in terms of promoting your field of research and the EUROCORES programme.

As a result of the work that has led to the formation of the VORONOI project, a comprehensive monograph on the subject has been completed and is about to be published:

F. Aurenhammer, R. Klein, and D.T. Lee.
Voronoi Diagrams and Delaunay Triangulations.
World Scientific Publishing Company (Book, 330 pages), in press.

4. List the cross-CRP activities your CRP has organised or co-organised. If your CRP has not been involved in organising any cross-CRP activity to date, what activities do you intend to propose and organise in the future?

- June 12, 2011. EuroGIGA Kickoff Session at the Symposium on Computational Geometry, Paris. (main organisation and speaker)
- March 22, 2012. EuroGIGA session in connection with EuroCG, the European Workshop on Computational Geometry, March 19-21, 2012, Assisi (Italy) (main organisation)
- Midterm Conference in Prague, Juli 9-13, 2012 (coorganized under the leadership of Jan Kratochvíl, GraDr)

- SHORT-TERM VISITS:
  A short-term visit by Evanthia Papadopoulou (IP7) to Ferran Hurtado of ComPoSe was approved. The visit will be Jan 8-17 approximately (1st or last day may change).
  A 6-week short-term visit of Balázs Keszegh from GraDr to IP4 (Berlin) has taken place.

B.4. Publications, dissemination and outreach

Publications

- *) publications which acknowledge the EUROCORES programme.
- Underlined: publications/presentations involving co-authors from at least two IPs within the CRP VORONOI.
- **Boldface: publications/presentations involving co-authors from other CRPs in the programme (GraDr, ComPoSe, GReGAS).**

Peer-reviewed articles in journals

- * **O. Aichholzer, F. Aurenhammer, E. D. Demaine, F. Hurtado, P. Ramos, and J. Urrutia, *On k-convex polygons*, Computational Geometry: Theory and Applications 45 (2012), 73–87.**
- * **O. Aichholzer, F. Aurenhammer, T. Hackl, C. Huemer, A. Pilz, and B. Vogtenhuber, *3-colorability of pseudo-triangulations*, submitted.**
- * **O. Aichholzer, F. Aurenhammer, T. Hackl, F. Hurtado, A. Pilz, P. Ramos, J. Urrutia, P. Valtr, and B. Vogtenhuber, *On k-convex point sets*, submitted.**
- O. Aichholzer, F. Aurenhammer, T. Hackl, B. Jüttler, M. Rabl, and Z. Šír, *Structural and computational advantages of circular boundary representation*, Int. J. Comp. Geom. Appl. **21** (2011), 47–69.
- **G. Aloupis, J. Cardinal, S. Collette, E. D. Demaine, M. L. Demaine, M. Dulieu, R. Fabila-Monroy, V. Hart, F. Hurtado, S. Langerman, M. Saumell, C. Seara, and P. Taslakian, *Non-crossing matchings of points with geometric objects*, Computational Geometry: Theory and Applications 46 (2013), no. 1, 78–92.**
- F. Aurenhammer and B. Jüttler, *On computing the convex hull of (piecewise) curved objects*, Mathematics in Computer Science **6** (2012), 261–266.
- **P. Bose, S. Collette, F. Hurtado, M. Korman, S. Langerman, V. Sacristán, and M. Saumell, *Some properties of k-Delaunay and k-Gabriel graphs*, Computational Geometry: Theory and Applications 46 (2013), no. 2, 131–139.**
- S.-W. Cheng, C. Knauer, S. Langerman, and M. Smid, *Approximating the average stretch factor of geometric graphs*, Journal of Computational Geometry **3** (2012), no. 1, 132–153.
- V. Dujmovic and S. Langerman, *A center transversal theorem for hyperplanes and applications to graph drawing*, Discrete & Computational Geometry (2013), to appear.
- * Darius Geiß, Rolf Klein, Rainer Penninger, and Günter Rote, *Optimally solving a transportation problem using Voronoi diagrams*, Computational Geometry: Theory and Applications (2012), to appear.
- * Chih-Hung Liu, Evanthia Papadopoulou, and D. T. Lee, *The k-nearest-neighbor Voronoi diagram revisited*, Algorithmica (2012), submitted.
- T. Schiffer, F. Aurenhammer, and M. Demuth, *Computing convex quadrangulations*, Discrete Applied Mathematics **160** (2012), 648–656.

- B. Strodthoff, M. Schifko, and B. Jüttler, *Horizontal decomposition of triangulated solids for the simulation of dip-coating processes*, Computer-Aided Design **43** (2011), 1891–1901.

Published contributions to international conferences

- Oswin Aichholzer, Wolfgang Aigner, Franz Aurenhammer, Kateřina Čech Dobiášová, Bert Jüttler, and Günter Rote, *Triangulations with circular arcs*, Graph Drawing. GD 2011 (Marc van Kreveld and Bettina Speckmann, eds.), Lecture Notes in Computer Science, vol. 7034, Springer-Verlag, 2012, pp. 296–307.

- * W. Aigner, F. Aurenhammer, and B. Jüttler, *On triangulation axes of polygons*, Proc. 28th Workshop on Computational Geometry (Assisi, Italy), 2012, pp. 125–128.

- G. Aloupis, L. Barba, and S. Langerman, *Circle separability queries in logarithmic time*, Proceedings of the 24th Canadian Conference on Computational Geometry (CCCG 2012), 2012, pp. 113–118.

- * Cecilia Bohler, Panagiotis Cheilaris, Rolf Klein, Chih-Hung Liu, Evanthia Papadopoulou, and Maksym Zavershynskyi, *On the complexity of higher order abstract Voronoi diagrams*, submitted to conference.

- **P. Bose, J. Cardinal S. Collette, F. Hurtado, S. Langerman, M. Korman, and P. Taslakian, *Coloring and guarding arrangements*, Abstracts of the 28th European Workshop on Computational Geometry (EuroCG12) (Walter Didimo and Giuseppe Liotta, eds.), 2012, pp. 89–92.**

- **P. Bose, V. Dujmovic, F. Hurtado, J. Iacono, S. Langerman, H. Meijer, V. Sacristán, M. Saumell, and D.R. Wood, *Proximity graphs: E, δ, Δ, χ and ω*, Abstracts of the 28th European Workshop on Computational Geometry (EuroCG12) (Walter Didimo and Giuseppe Liotta, eds.), 2012, pp. 217–220.**

- **S. Cabello, J. Cardinal, and S. Langerman, *The clique problem in ray intersection graphs*, Proceedings of the European Symposium on Algorithms (ESA2012), LNCS, vol. 7501, 2012, pp. 241–252.**

- * **J. Cardinal, N. Cohen, S. Collette, M. Hoffmann, S. Langerman, and G. Rote, *Coloring dynamic point sets on a line*, Abstracts of the 28th European Workshop on Computational Geometry (EuroCG12) (Walter Didimo and Giuseppe Liotta, eds.), 2012, pp. 209–212.**

- * Panagiotis Cheilaris, Elena Khramtcova, and Evanthia Papadopoulou, *Randomized incremental construction of the Hausdorff Voronoi diagram. the case of non-crossing clusters.*, submitted to conference.

- * Darius Geiß, Rolf Klein, and Rainer Penninger, *Optimally solving a transportation problem using Voronoi diagrams*, Proceedings 18th International Computing and Combinatorics Conference (COCOON' 2012) (Julian Mestre and Anastasios Viglas, eds.), 2012, pp. 264–274.

- Miroslaw Kowaluk, *Planar β-skeletons via point location in monotone subdivisions of subset of lunes*, Abstracts of the 28th European Workshop on Computational Geometry (EuroCG'12) (Walter Didimo and Giuseppe Liotta, eds.), March 2012, pp. 225–227.

- * Miroslaw Kowaluk and Gabriela Majewska, *New sequential and parallel algorithms for computing β-spectrum*, Symposium on Computational Geometry, November 2012, submitted to SoCG 2013.

- Chih-Hung Liu and Der-Tsai Lee, *Higher-order geodesic Voronoi diagrams in a polygonal domain with holes*, Proceedings ACM-SIAM Symposium on Discrete Algorithms (SODA' 2013) (Julian Mestre and Anastasios Viglas, eds.), 2013.

- * Evanthia Papadopoulou and Sandeep Kumar Dey, *The l_∞ (l_1) farthest line segment Voronoi diagram*, Proc. 9th International Symposium on Voronoi Diagrams in Science and Engineering (ISVD'12), IEEE-CS, 2012, pp. 49–55.

- * Evanthia Papadopoulou and Sandeep Kumar Dey, *On the farthest line segment Voronoi diagram*, Proc. 23rd International Symposium on Algorithms and Computation (ISAAC'12), Lecture Notes in Computer Science, vol. 7676, Springer-Verlag, 2012, pp. 187–196.

- * Evanthia Papadopoulou and Sandeep Kumar Dey, *On the farthest line segment Voronoi diagram*, Abstracts of the 28th European Workshop on Computational Geometry (EuroCG'12) (Walter Didimo and Giuseppe Liotta, eds.), March 2012, pp. 237–240.

- * Evanthia Papadopoulou and Maksym Zavershynskyi, *On higher-order Voronoi diagrams of line segments*, Proc. 23rd International Symposium on Algorithms and Computation (ISAAC'12), Lecture Notes in Computer Science, vol. 7676, Springer-Verlag, 2012, pp. 177–186.

- * Evanthia Papadopoulou and Maksym Zavershynskyi, *On higher-order Voronoi diagrams of line segments*, Abstracts of the 28th European Workshop on Computational Geometry (EuroCG'12) (Walter Didimo and Giuseppe Liotta, eds.), March 2012, pp. 233–236.

Other articles

- Cecilia Bohler and Rolf Klein, *Abstract Voronoi diagrams with disconnected regions*, in preparation.

- Panagiotis Cheilaris and Evanthia Papadopoulou, *On disconnected regions in the Hausdorff Voronoi diagram of clusters of segments*, in preparation.

- Sandeep Kumar Dey, Panagiotis Cheilaris, and Evanthia Papadopoulou, *The in-circle predicate for the L_∞ Voronoi diagram of line segments*, in preparation.

- Miroslaw Kowaluk, Gabriela Majewska, and Evanthia Papadopoulou, *Generalized β-skeletons*, in preparation.

Books and book chapters

- O. Aichholzer, W. Aigner, F. Aurenhammer, and B. Jüttler, *Exact medial axis computation for triangulated solids with respect to piecewise linear metrics*, Curves and Surfaces (J.-D. Boissonnat, P. Chenin, A. Cohen, C. Gout, T. Lyche, M.-L. Mazure, and L. Schumaker, eds.), Lecture Notes in Computer Science, vol. 6920, Springer, 2012, pp. 1–27.

- Franz Aurenhammer, Rolf Klein, and Der-Tsai Lee, *Voronoi diagrams and Delaunay triangulations*, World Scientific Publishing Company, 2013, 312 pages, to appear.

- * Adrian Dumitrescu, Günter Rote, and Csaba D. Tóth, *Monotone paths in planar convex subdivisions and polytopes*, Discrete Geometry (Antoine Deza, ed.), Fields Institute Communications Series on Discrete Geometry and Optimization, Springer-Verlag, 2013, to appear.

Presentations in scientific meetings

- Oral presentations (indicate invited / keynote talks)

2011

Günter Rote.
Arc triangulations.
Graph Drawing (GD 2011), Eindhoven, September 21-23, 2011.

Günter Rote.
Realizing planar graphs as convex polytopes (keynote talk).
Graph Drawing (GD 2011), Eindhoven, September 21-23, 2011.

Bert Jüttler.
Applied Geometry @ JKU.
Voronoi Kick-Off Meeting, Lugano, October 7-11, 2011.

Birgit Strodthoff.
Horizontal decomposition of triangulated solids for the simulation of dip coating processes.
Voronoi Kick-Off Meeting, Lugano, October 7-11, 2011.

Gernot Walzl.
Introduction to Straight Skeletons.
Voronoi Kick-Off Meeting, Lugano, October 7-11, 2011.

Günter Rote.
Motion planning for a rigid planar robot (invited talk).
Austrian National Research Network Industrial Geometry Closing Workshop, Vienna, October 19-21, 2011.

Birgit Strodthoff.
Horizontal decomposition of triangulated solids for the simulation of dip coating processes.
NRN Industrial Geometry Closing Workshop, Vienna, October 19-21, 2011.

2012

Günter Rote.
Polytopes and plane graphs with no long monotone paths.
Bernoulli-Reunion conference on Discrete and Computational Geometry, EPFL Lausanne, February 27 - March 2, 2012.

Wolfgang Aigner.
On triangulation axes of polygons
28th European Workshop on Computational Geometry (EuroCG 2012), Assisi, March 19-21, 2012.

Miroslaw Kowaluk.
Planar β-skeletons via point location in monotone subdivisions of subset of lunes.
28th European Workshop on Computational Geometry (EuroCG 2012), Assisi, March 19-21, 2012.

Evanthia Papadopoulou.
On the farthest line-segment Voronoi diagram.
28th European Workshop on Computational Geometry (EuroCG 2012), Assisi, March 19-21, 2012.

Rainer Penninger.
Optimally solving a general transportation problem using Voronoi diagrams.
28th European Workshop on Computational Geometry (EuroCG 2012), Assisi, March 19-21, 2012.

Günter Rote.
Motion planning for a rigid robot in the plane (invited talk).
28th European Workshop on Computational Geometry (EuroCG 2012), Assisi, March 19-21, 2012.

Maksym Zavershynskyi.
On higher-order Voronoi diagrams of line segments.
28th European Workshop on Computational Geometry (EuroCG 2012), Assisi, March 19-21, 2012.

Evanthia Papadopoulou.
The L-infinity (L-1) farthest line-segment Voronoi diagram.
International Symposium on Voronoi Diagrams in Science and Engineering (ISVD'12), Rutgers University, New Brunswick, June 27-29, 2012.

Cecilia Bohler.
Abstract Voronoi diagrams with disconnected regions.
ESF EuroGIGA Midterm Conference, Charles University, Prague, Czech Republic, July 9-13, 2012.

Panagiotis Cheilaris.
The Hausdorff Voronoi diagram - recent advances.
ESF EuroGIGA Midterm Conference, Charles University, Prague, Czech Republic, July 9-13, 2012.

Rafel Jaume.
Recursive regularity.
ESF EuroGIGA Midterm Conference, Charles University, Prague, Czech Republic, July 9-13, 2012.

Gabriela Majewska.
Spectrum of the lune-based beta-skeletons.
ESF EuroGIGA Midterm Conference, Charles University, Prague, Czech Republic, July 9-13, 2012.

Evanthia Papadopoulou.
On the farthest and higher order Voronoi diagrams of line segments.
ESF EuroGIGA Midterm Conference, Charles University, Prague, Czech Republic, July 9-13, 2012.

Günter Rote.
Coloring points for bottomless rectangles.
ESF EuroGIGA Midterm Conference, Charles University, Prague, Czech Republic, July 9-13, 2012.

Birgit Strodthoff.
Computation of Reeb graphs on 3D-manifolds from a boundary representation.
ESF EuroGIGA Midterm Conference, Charles University, Prague, Czech Republic, July 9-13, 2012.

Gernot Walzl.
Straight Skeletons of Polyhedra - An Implementation.
ESF EuroGIGA Midterm Conference, Charles University, Prague, Czech Republic, July 9-13, 2012.

Birgit Strodthoff.
Computation of Reeb graphs on 3D-manifolds from a boundary representation.
NFN Geometry+Simulation Kick-Off Meeting, Vorau, July 17, 2012.

Cecilia Bohler.
Optimally solving a transportation problem using Voronoi diagrams.
18th Annual International Computing and Combinatorics Conference (COCOON 2012), Sydney, August 20-22, 2012.

Mario Kapl.
Anisotropic Voronoi diagrams from distance graphs.
Voronoi Midterm Workshop, Ratsch a.d. Weinstraße, September 17-20, 2012.

Günter Paulini.
Recognition of shape Delaunay triangulations
Voronoi Midterm Workshop, Ratsch a.d. Weinstraße, September 17-20, 2012.

Gernot Walzl.
Straight Skeletons of general polyhedra.
Voronoi Midterm Workshop, Ratsch a.d. Weinstraße, September 17-20, 2012.

Evanthia Papadopoulou.
On the farthest line-segment Voronoi diagram.
International Symposium on Algorithms and Computation (ISAAC'12), Taipei, Taiwan, December 19-21, 2012.

Maksym Zavershynskyi.
On higher-order Voronoi diagrams of line segments.
International Symposium on Algorithms and Computation (ISAAC'12), Taipei, Taiwan, December 19-21, 2012.

Public outreach - Outreach into schools

In February 2012, a project on Computational Geometry was presented by IP2 at Johannes-Kepler-Universität Linz in the frame of a yearly mathematical project week for high-school students, see http://www.projektwoche.jku.at/2012/projekt2012_proj05.shtml.

Other activities / Websites

http://eurogiga.inf.fu-berlin.de/ is a WIKI-Website both for announcements and coordination of EuroGIGA as a whole, as well as within the VORONOI CRP.

B.5. Feedback on the EUROCORES programme and EUROCORES scheme

The project integrates researchers from centers in different countries of Europe, both countries which are traditionally strong in collaborative research and countries which have so far not been involved in multinational collaborations. It stimulates an exchange of opinions between researchers from different centers. It enables joint work for groups and not only for individual researchers.
The organisational overhead is relatively light, and the support of networking activities is very useful.
A problem is that different organisations in different nations operate very differently, and therefore the different IPs have different starting dates.