	EUROPEAN COMMISSION RESEARCH DG HUMAN RESOURCES AND MOBILITY	RTN Mid-Term Activity Report

Project No: 35651

Project Acronym: CODY

Project Full Name: Conformal Structures and Dynamics

Marie Curie Actions

RTN Mid-Term Activity Report

Period covered: from 01/01/2007 **to** 31/12/2008

Start date of project: 01/01/2007

Project coordinator name:

Project coordinator organisation name:
THE UNIVERSITY OF WARWICK

Date of preparation: 26/02/2009

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Marie Curie Actions

RTN Mid-Term Activity Report

GENERAL INFORMATION

Project No:	35651
Project acronym:	CODY
Project full name:	Conformal Structures and Dynamics
Period number:	1st
Period covered - start date:	01/01/2007
Period covered - end date:	31/12/2008
Project start date:	01/01/2007
Project duration [months]:	48
Project coordinator name:	
Project coordinator organisation name:	THE UNIVERSITY OF WARWICK
Date of submission:	26/02/2009

SUMMARY OF THE RECRUITMENT SINCE THE START OF THE PROJECT

Contractor: THE UNIVERSITY OF WARWICK

Name of the Researcher (as stated at time of selection)	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months
		Country	LFR					
Ferry Kwakkel	ESR (<4 years)	NL-Netherlands	No	Male	01/01/2007	30/06/2009	Full Time	24.0
Agnieszka Badenska	ESR (<4 years)	PL-Poland	No	Female	01/02/2008	31/07/2008	Full Time	6.0

Contractor: INSTYTUT MATEMATYCZNY POLSKIEJ AKADEMII NAUK.

Name of the Researcher (as stated at time of selection)	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months
		Country	LFR					
Irene Raquel Inoquio Renteria	ESR (<4 years)	PE-Peru	No	Female	01/09/2007	29/02/2008	Full Time	6.0
Neil Dobbs	ER (4-10 years)	IE-Ireland	Yes	Male	01/09/2007	31/08/2008	Full Time	12.0
Oscar Santamaria Santisteban	ESR (<4 years)	PE-Peru	No	Male	18/08/2008	17/01/2009	Full Time	4.5
Barany Balazs	ESR (<4 years)	HU-Hungary	No	Male	28/08/2008	28/08/2009	Full Time	4.25

Contractor: HELSINGIN YLIOPISTO

Name of the Researcher (as stated at time of selection)	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months
		Country	LFR					
Albert Clop	ER (4-10 years)	ES-Spain	No	Male	01/09/2007	29/02/2008	Full Time	6.0
Victor Cruz Barriquete	ESR (<4 years)	MX-Mexico	No	Male	01/09/2008	28/02/2009	Full Time	4.0
Laurent Marin	ESR (<4 years)	FR-France	No	Male	01/10/2008	30/09/2009	Full Time	3.0
Niklas Brannstrom	ER (4-10 years)	SE-Sweden	No	Male	05/01/2009	04/01/2010	Full Time	0.0

Contractor: CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE (CNRS)

Name of the Researcher (as stated at time of selection)	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months
		Country	LFR					
Kuntal Banerjee	ESR (<4 years)	IN-India	No	Male	01/03/2007	31/10/2009	Full Time	22.0
Magnus Aspenberg	ER (4-10 years)	SE-Sweden	No	Male	01/08/2007	31/01/2008	Full Time	6.0
Ludwig Jaksztas	ESR (<4 years)	PL-Poland	No	Male	01/03/2008	31/08/2008	Full Time	6.0

Contractor: UNIVERSITAT DE BARCELONA

Name of the Researcher (as stated at time of selection)	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months
		Country	LFR					
Jorn Peter	ER (4-10 years)	DK-Denmark	No	Male	05/09/2008	04/09/2009	Full Time	4.0
Asli Deniz	ESR (<4 years)	TR-Turkey	No	Female	01/03/2009	28/02/2010	Full Time	0.0

Contractor: CHRISTIAN-ALBRECHTS-UNIVERSITAET ZU KIEL.

Name of the Researcher (as stated at time of selection)	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months
		Country	LFR					
Magnus Aspenberg	ER (4-10 years)	SE-Sweden	No	Male	01/07/2008	30/06/2009	Full Time	6.0

Contractor: ROSKILDE UNIVERSITETSCENTER.

Name of the Researcher (as stated at time of selection)	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months
		Country	LFR					
Anja Kabelka	ER (4-10 years)	DE-Germany	No	Female	01/02/2008	31/01/2009	Full Time	11.0
Sebastian Godillon	ESR (<4 years)	DE-Germany	No	Male	01/02/2009	31/07/2009	Full Time	0.0

Contractor: TECHNOLOGICAL EDUCATIONAL INSTITUTE OF WEST MACEDONIA

Name of the Researcher (as stated at time of selection)	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months
		Country	LFR					
Nina Snigireva	ESR (<4 years)	IE-Ireland	No	Female	01/10/2007	31/01/2008	Full Time	4.0
Jorg Neunhauserer	ER (4-10 years)	DE-Germany	No	Male	01/03/2009	30/06/2009	Full Time	0.0

Contractor: UNIVERSITE DE GENEVE

Name of the Researcher (as stated at time of selection)	Type	Origin		Gender	Start date of recruitment	End date of recruitment	Working time commitment	No. of full-time equivalent months
		Country	LFR					
Izyurov Konstantin	ESR (<4 years)	RU-Russian Federation	No	Male	16/08/2007	15/08/2008	Full Time	12.0
Istvan Prause	ER (4-10 years)	HU-Hungary	No	Male	01/01/2008	30/06/2008	Full Time	6.0
Hugo Duminil-Copin	ESR (<4 years)	FR-France	No	Male	01/11/2008	31/10/2009	Full Time	2.0

TOTAL PMM PER CONTRACTOR

Contractor: THE UNIVERSITY OF WARWICK

No. of full-time equivalent months to be delivered according to the contract: 12

No. of full-time equivalent months covered by this recruitment during this reporting period
30.0

Contractor: INSTYTUT MATEMATYCZNY POLSKIEJ AKADEMII NAUK.

No. of full-time equivalent months to be delivered according to the contract: 18

No. of full-time equivalent months covered by this recruitment during this reporting period
26.75

Contractor: HELSINGIN YLIOPISTO

No. of full-time equivalent months to be delivered according to the contract: 12

No. of full-time equivalent months covered by this recruitment during this reporting period
13.0

Contractor: CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE (CNRS)

No. of full-time equivalent months to be delivered according to the contract: 15

No. of full-time equivalent months covered by this recruitment during this reporting period
34.0

Contractor: UNIVERSITAT DE BARCELONA
No. of full-time equivalent months to be delivered according to the contract: 6

No. of full-time equivalent months covered by this recruitment during this reporting period
4.0

Contractor: CHRISTIAN-ALBRECHTS-UNIVERSITAET ZU KIEL.
No. of full-time equivalent months to be delivered according to the contract: 0

No. of full-time equivalent months covered by this recruitment during this reporting period
6.0

Contractor: ROSKILDE UNIVERSITETSCENTER.
No. of full-time equivalent months to be delivered according to the contract: 6

No. of full-time equivalent months covered by this recruitment during this reporting period
11.0

Contractor: TECHNOLOGICAL EDUCATIONAL INSTITUTE OF WEST MACEDONIA
No. of full-time equivalent months to be delivered according to the contract: 8

No. of full-time equivalent months covered by this recruitment during this reporting period
4.0

Contractor: UNIVERSITE DE GENEVE
No. of full-time equivalent months to be delivered according to the contract: 6

No. of full-time equivalent months covered by this recruitment during this reporting period
20.0

TOTAL PMM FOR ALL CONTRACTORS

No. of full-time equivalent months to be delivered according to the contract	No. of full-time equivalent months covered by this recruitment during this reporting period
83.0	148.75

SUMMARY OF THE MAJOR PROJECT ACHIEVEMENTS SINCE THE START OF THE PROJECT

Describe what you would consider to be the most outstanding or more particularly significant outcome of the work performed during the period covered by this report, in terms of scientific/technological results, research training methodologies, opening up of career opportunities to researchers, international networking of the concerned scientific community, etc.

The research of CODY falls into six general areas:
(I) Conformal structures, analytic and geometric background and view;
(II) Potential theory, analytic tools, Topics in Fractals and Multifractal Analysis,
(III) Iteration of interval and circle maps, and the complexification, weak hyperbolicity and physical measures (D1) and Beyond Dimension One (D5)
(IV) Geometry of dynamical and parameter space,
(V) Hausdorff measure and dimension. Limit sets of Kleinian groups and relations. Iterated Function Systems,
(VI) Scaling limits, conformal invariance and universality. Infinite dimensional systems and Turbulent transport

Significant progress has been made in each of these areas, see the attached report on the research outcomes. In the list of publications (192 in total for year 2) of members of the network we have marked the (many) papers that are directly related to the network tasks with a (*). We are confident that we will be able to deliver all the research tasks scheduled for. It is pleasing that each node is contributing to the network tasks in a positive way. The many network activities have helped co-operation between nodes. For example, during the second year of the network there were 19 publications by members of CODY which involved at least two networks.

It is also remarkable that many of the appointed ESR's and ER's came from or went to one of the other nodes (see below for details). Another striking measure of the success of the network, is the number of papers that were produced by the ESR and ER's. Together they produced 38 publications by during the last two years (note, however, that some of these resulted from work initiated before). Several ESR and ER's published joint papers (not necessarily with members of the network).

Some of the main breakthroughs in the CODY research were on
(i) the study of maps with unbounded but controlled quasiconformal dilatation (Astala, Clop and others)
(ii) results on physical measures of interval maps (Avila, Lyubich, van Strien, Bruin, Shen),
(iii) the measure of Julia set (Buff and Cheritat),
(iv) link between parabolic implosion and Haussdorff dimenson (Jackstasz and Zinsmeister)
(iv) Relating the growth rate of entire functions and the Hausdorff dimension of its Julia set (Bergweiler, Karpinska, Stallard - a three team effort!!)
(v) description of the parameter space of multicritical maps (Kabelka, Aspenberg, Petersen and others)
(vi) a better understanding of conformal structures in random cluster models (Smirnov and others)

The milestones which were listed as targets of the CODY network of the first 30 months were all achieved:
* M C.1 Opening Conference (Held in June 2007)
* M IV.1 Deeper understanding of bifurcations of parabolic points. (This was achieved in particular through the work of Cheritat, who developed a theory of parabolic implosion in the light of Oudkerk's work)
* M I.1 Advances in surgery in holomorphic dynamics. (This was achieved in particular through the effort of Haissinsky, Tan Lei, Fagella and others, enabling to consider situations where one has to deal with unbounded quasiconformal dilatation, building on work of David and others)
* M II.1 Publication on geometry of measures and multi-fractal analysis (non-uniform or non-conformal scaling) (A publication on this is in preparation by Bisbas and Snigireva)
* M I.2 Geometric regularity and removability results for certain mappings of controlled unbounded

distortion. (This was achieved through the work of Astala, Clop and others)

Prizes. In mathematics, prizes are fairly rare. Even so, it is worth mentioning prizes which were awarded to some of the CODY members:
* Avila, European Congress of Mathematics in July 2008, 5 years research fellowship from the Clay Mathematics Institute, Wolff Memorial Lectures at Caltech, 2008.
* Zorich, ICM talks (Barcelona 2006).
* Buff and Cheriitat, Laureat 2006 du prix Leconte de l'Academie des Sciences.
As in mathematics it usually takes several years before a paper is cited a significant number of times, it does not make much sense to list the citations of papers that were the result of the network. However, it is clear that CODY is at the centre of all activity within the field (most of the conferences within the field in Europe a either (co)organised by CODY, and many of the key speakers at conferences outside Europe are members from CODY).

Training and Transfer of Knowledge

One of the aims of CODY is to be inclusive, by opening up its workshops and conferences also to young researchers not employed by the network. Several of these young researchers, who already have a PhD or a postdoc position and have attended many of the CODY training events, then are employed by CODY for a shorter period as a kind of secondment to the network. This works very well, as it allows these researchers to learn new ideas and approaches by staying in one of the nodes of CODY.
In many cases, what happens is the following: a PhD or postdoc in one node is already able to fully benefit from the training and workshops provided (and made possibly) by CODY in spite of the fact that he/she is paid from other sources of funding, but then is appointed for a period at a CODY node. In other cases, a person is initially funded by CODY, but then other funding is found. Some of the fellows were employed in two or three nodes,
and in this way not only strengthen the interaction between the nodes, but also enhance their network of contacts and their CV significantly. By operating in this way, a very large number researchers benefit from CODY, and the impact CODY to the research field is making is much wider than if only a small number of researchers were appointed for the full duration of the network.

Each of the nodes of the network is organising a local seminar, most of them weekly (or even more often). These seminars are a very good way for the ESR and ER's to learn what others are doing, but also to present their own results in a friendly environment.

The ESR and ER's are always encouraged to give talks at network events, and their supervisor usually helps them preparing their presentations. Many of the ESR and ER's also give regularly talks at their local seminars.

In total, so far, 19 ESR's and 9 ER's were appointed by the network. As mentioned, the fact that many of these appointed for shorter periods has contributed to the vibrancy of the network. Many of these ESR's and ER's went CODY meetings before and after their appointments and stay in touch with the nodes in which they were appointed.

To be able to make maximal use of the best candidates and to fit in with our recruitment plans, a few nodes will or have needed to merge or split positions. For more details, see the section on amendments below.

CODY will soon be on schedule in terms of the person-months foreseen by the contract.
This can be seen in the following table, which shows the number of months which will have been filled with ESR and ER's who either have been, are or soon will be employed. Here only people are included who are not currently employed fellow, to whom firm offers of contracts to specific individuals were made with starting dates within the next few months.
(Of course the assumption here is that fellows stay for the duration of their contracts, which so far has been always the case.) For the outstanding open positions, the table also indicates at what stage the recruitment is.

Node Proportion of posts filled Outstanding recruitment

Warwick ESR 36/36 ER 0/24 The remaining ER positions have been advertised with a deadline of 15.4.09
Several suitable applicants
Warsaw ESR 24/36 ER12/24 The remaining ESR position has been advertised and there are several suitable applicants
Helsinki ESR 24/24 ER 18/18
CNRS ESR 32/36 ER 16/24 Suitable candidates available
Barcelona ESR 24/24 ER 12/12
Kiel ESR 12/24 ER 12/12 The remaining ESR position has been advertised with a deadline of 31/5/09
Roskilde ESR 21/36 ER 12/12 There is a candidate for the remaining ESR position
TEI ESR 10.5/20 ER 4/8 It is likely the ER position will be extended. The ESR has 5 months still to fill and an additional four months not foreseen until 2010
Geneve ESR 24/24 ER 6/12 The remaining position is not foreseen until 2010, but good candidates are already available

As is clear from this table, CODY is on schedule to complete the contracted research appointments.

Let us also comment on the 'connectedness' of the network by commenting on the appointed ESR's and ER's and their 'history'. We use F to indicate female fellows and a * to indicate names of individuals who will start by the summer of 2009, and to who offers of positions were made (and who accepted these offers).

ESR

Researcher	Gender	Contract length	Node	Career
Kwakkel	M	30 months	Warwick	Job offer in Brazil starting late 2009
Badenska	F	6 months	Warwick	Completing PhD n Warsaw
Renteria	F	6 months (non EU)	Warsaw	May return to Warsaw
Santisteban	M	2 month	Warsaw	Temporarily withdrawn for personal reasons
Barany	M	12 months	Warsaw	Will complete PhD in Hungary
Cruz	M	6 months (non EU)	Helsinki	Will complete PhD in Spain
Kalansinski	M	6 months	Helsinki	
Marin	M	12 months	Helsinki	
Banerjee	M	32 months (non EU)	CNRS	
Deniz	F	12 months	Barcelona	
Benini	F	12 months	Barcelona	
Dias	F	12 months (non EU)	Keil	
Godillon	M	6 months	RUC	
Lomonaco	F	15 months	RUC	
Snigireva	F	4 months	TEI	Completed PhD in UK, went to Bremen and is now a researcher in France
Thomson	M	4 months	TEI	
Pronco	M	12 months	TEI	
Konstantin	M	12 months (non EU)	Geneve	Will complete PhD in Geneve with other funding
Duminil-Copin	M	12 months	Geneve	

ER

Dobbs	M	12 months	Warsaw	Came from France, and now has position in Sweden
Clop	M	6 months	Helsinki	Went to Jyvaskyla but now has position in Helsinki
Brannstrom	M	12 months	Helsinki	Came from Warwick Node
Jacksztasz	M	6 months	France	Now again in Warsaw node
Aspenberg	M	6 months	France	Moved to research position in Warsaw
Peter	M	12 months	Barcelona	
Aspenberg	M	12 months	Kiel	Came from Warsaw
Kabelka	F	12 months	RUC	
Naumeister	M	4 months	TEI	
Prause	M	6 months	Geneve	

The fellows are all benefiting from the possibility to attend conferences.

Some of the fellows who are appointed for say a year to work in one of the nodes, are so eager to get the maximal benefit of their stay, that they may not be so keen to go to conferences during this period. Since the network is able to support attendance at CODY workshops also after their appointment ends (through category F funding), this is not a disadvantage for the fellows. Unfortunately this means that some of the nodes have not spent sufficiently on category E funding. One of the tasks the network is setting itself for the remaining duration of the network is to encourage fellows to travel more widely. The network office is ensuring that mobility allowance and travel allowances are paid as according to what the fellows are due.

DISSEMINATION OF RESULTS OF THE PROJECT

Participation in conferences and other scientific events

Type of Event	Active participation			Passive participation
	Oral	Poster	Of which were invited presentations	
Conferences	98	2	70	111
Workshops	110	16	83	239
Other Scientific Meetings	40	1	30	83

Publications

Type of Publication	Total	Of which involved recruited researchers	Of which joint publications involving at least 2 network contractors	Of which invited
Peer Reviewed - Articles in Journals	68	11	10	0
Peer Reviewed - Chapters in Books	10	0	1	0
Peer Reviewed - Articles in Conference Proceedings	0	0	0	0
Peer Reviewed - Books and Monographs	5	1	0	0
Non-Peer Reviewed	0	0	0	0
Submitted	60	15	8	0
Manuscripts in preparation	13	11	0	0

List of joint publications

One (partial) outcome of the network is a number of books, with some chapters written by members of the network.
* Transcendental Dynamics and Complex Analysis, London Mathematical Society Lecture Note Series (No. 348),
Edited by Philip J. Rippon, Gwyneth M. Stallard (UK team), June 2008
with joint work: Combinatorics of bifurcations in exponential parameter space by L. Rempe and D. Schleicher (UK and German team)
* Complex Dynamics: Families and Friends, edited by Dierk Schleicher (German team), March 2009
* Surgery in complex dynamics, Nuria Fagella (Barcelona) in preparation. This work will be an invaluable source for future researchers in the field, and the available chapters are already being used for training ESR's and ER's.
* Elliptic PDE's and quasiconformal mappings, by Astala, Iwaniec and Martin, appeared in Princeton mathematical series, 2209. The monograph gives a modern introduction and overview of the planar quasiconformal mappings, including holomorphic motions and interactions with complex dynamics.

As mentioned, there were 30 publications during the last year alone that involved several networks.

Patents

Number of patents granted:	0
Number of patents pending:	0

MAJOR PROBLEMS/DIFFICULTIES

Please specify any major problems/difficulties you may have encountered until now or may anticipate in the near future, and suggest possible remedial actions at network and/or commission level.

We feel we do not have to make major amendments, but there are some small adjustments we would like to make:

To be able to make maximal use of the best candidates and to fit in with our recruitment plans, a few nodes will or have needed to merge or split positions.
Kabelka's 6 month appointment as ER in the node in Denmark was extended to 12 months as it turned out that her project was more extensive, and had more ramifications, than envisaged. (As is clear from her report, her work is going very well.)
One of the two 12 ESR months positions in the node in Helsinki will be split up into two 6 months appointment: a very suitable candidate from Poland is able to tackle the research (as his prior research is very close), but needs to return after 6 months to Poland to complete his PhD for contractual reasons.
Another suitable candidate for the remaining 6 months has already been found.
The Warwick node decided to delay the appointment of the ER posts until a starting date of October 2009, as Warwick will be able to offer more relevant activities during the academic year 2009-2010.
The Barcelona node started their ESR position only in February 2009, as the chosen candidate could only start at that point.
The node in Kiel will split their 24 month ESR position into two, in order to be able to employ two outstanding candidates.
The Greek node has only appointed one ESR so far, but offers were made and accepted by two further ESR's and one ER is expected to start on 1st March 2009.

A point of attention for the network will be to encourage ESR an ER's to make full use of their ability to travel extensively (through category E funding).

Attachments	cody_publ_yr2.pdf, Final scientific report.pdf, Training.doc, Summary of research interests.doc, Researchers reports.doc, publications_esr+er2008 (2).doc, Two or more teams.doc
Name	
Date	
Signature	