



Internationalisation of doctoral training: Evaluation of DFG's International Research Training Groups

The DFG

Germany's largest research funding organisation...

- ▶ is a **self-governing** research funding organisation
(association under German private law, members are German universities, non-university research institutions, academies and scientific associations)
- ▶ is **Europe's largest** funding organisation for basic research (total budget 2014: ~2.8 bn €)
- ▶ serves **all branches of science and the humanities** by funding research projects
- ▶ supports **education and advancement** of young researchers
- ▶ fosters **relations between scientists and academics at home and abroad**



Graduate Education in Germany

- ▶ Ph.D. after Master's/diploma degree
- ▶ Prior to 1990: a non-institutionalised “cottage industry”:
 - Apprenticeship model
 - “thesis-only”, no additional course offers
 - Increasing time-to-degree and difficulty with transition into non-academic market
- ▶ DFG **Research Training Groups** (1990):
qualification of doctoral researchers within the framework of a focused research programme and a structured training strategy. Promote early independence and international cooperation in the area of doctoral training

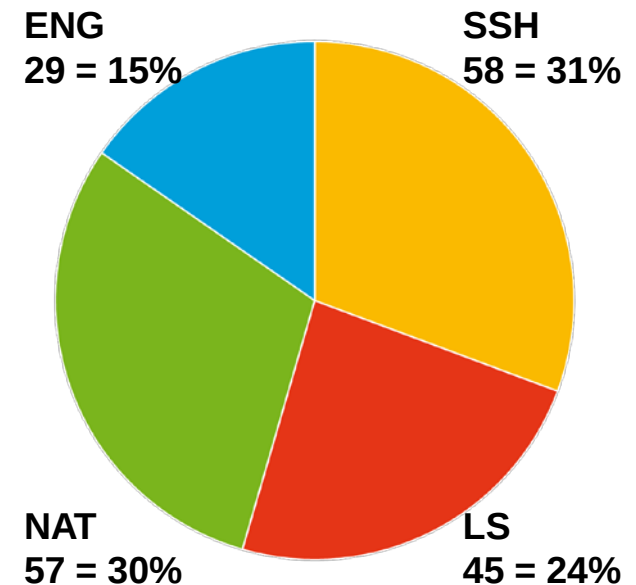


Research Training Groups

Programme characteristics

- ▶ applied for by university
- ▶ research-focused unit of **5-12** participating senior researchers
- ▶ structured PhD programme at a university,
- ▶ **Funding** provided for 9 years:
 - for **People** (3 cohorts of 10-15 PhD students) and
 - **Resources** (consumables, mobility, guest scientists)
- ▶ Annual Expenditure (2014): **~157 M€**

189 RTG/IRTG by field (Dec 15)



International Research Training Groups

The international variant of RTG

- ▶ *conflict of international mobility and shortening TTD?*

European / International Research Training Groups

- ▶ **bilateral** cooperation - two complementary sites
- ▶ cooperative research, joint supervision and qualification programme
- ▶ **reciprocal research stays** of PhD students as “transmission belt” (~6 months)
- ▶ **complementary funding** required (extramural or intramural)

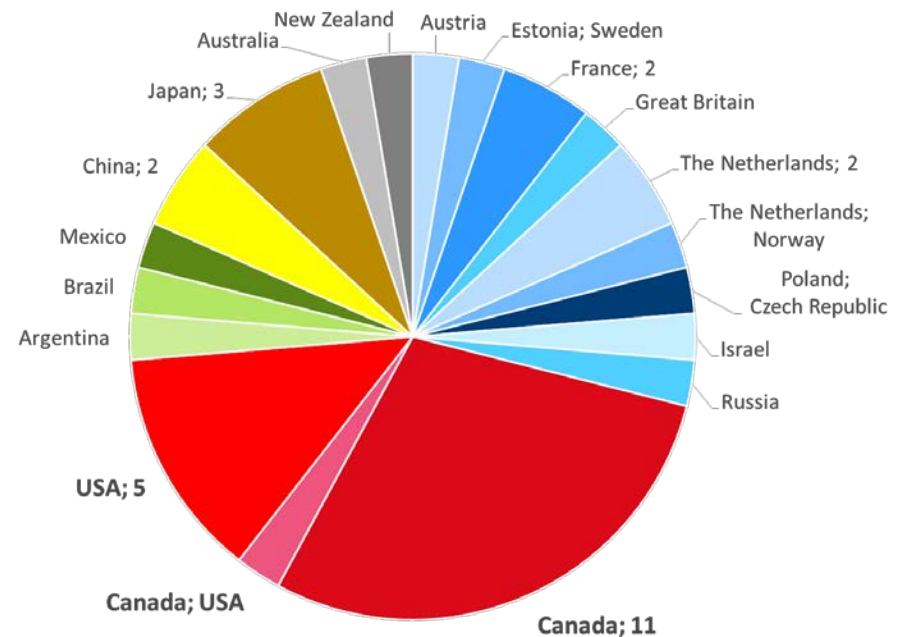


International Research Training Groups

The international variant of RTGs

- ▶ funded from RTG programme budget
- ▶ **no priorities** for variant/discipline/partner country
- ▶ Average annual funding per IRTG: ~**800,000 €** (2013)
- ▶ ~20% of RTG are IRTG (38/189)
- ▶ 1997-2015: partners in **32** countries world-wide
- ▶ strongest partner region:
North America (CAN > USA)

38 IRTG by countries (Dec 15)



Evaluation: Motivation and approach

- ▶ IRTG occupy significant share of the RTG programme
- ▶ 1997-2013: **159** IRTG established (grant total: 367 M€)
- ▶ “critical mass” for evaluation: **71** (successful) renewals

Approach

- ▶ Advisory „steering committee“
(*academic and federal/state members of RTG Grants Committee, Senate, Executive Committee*)
- ▶ Study commissioned to external evaluation agency
(*technopolis Vienna/Austria*)
- ▶ combination of quantitative and qualitative analyses
- ▶ 1-year-project, carried out 2013-2014

Objectives

1. (Theoretical) development of criteria for internationalisation and indicators
2. Description of internationalisation activities and effects in IRTGs
3. Evaluation of the programme
4. Assessment of its strengths and weaknesses

Three stakeholder groups:

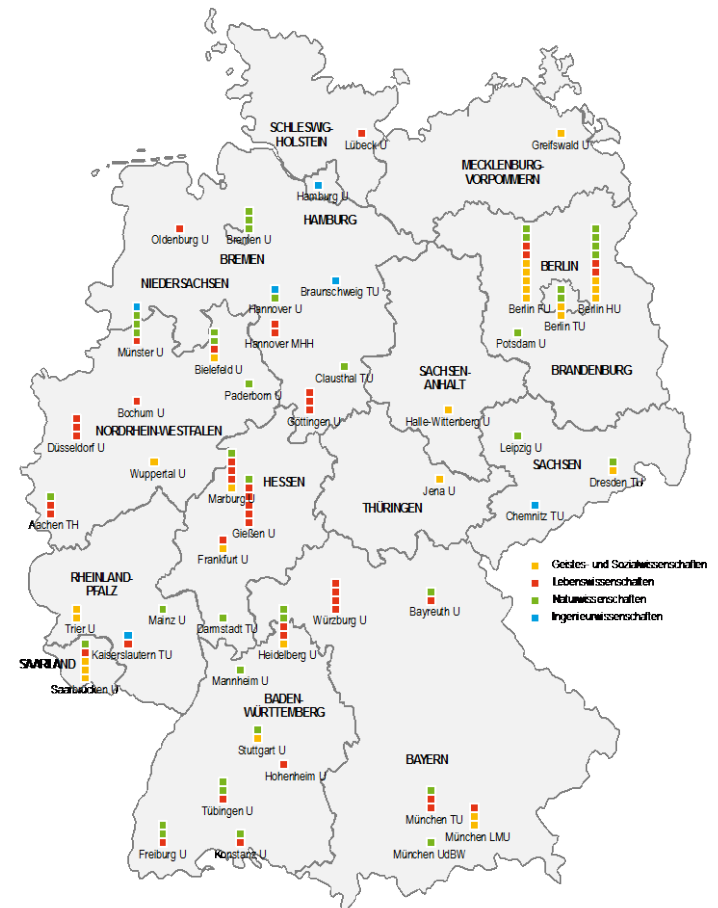
- ▶ Doctoral researchers
- ▶ Participating researchers („PIs“)
- ▶ Institutions (Universities)

Methods

- ▶ Literature review on internationalisation in doctoral phase
 - *carried out by STEPS, University Twente/NL*
- ▶ Interviews with stakeholders from all groups
 - *More than 80+ interviews conducted, mainly with German participants*
- ▶ Bibliometric analysis of IRTG (vs. RTG) in Life Sciences and Chemistry
 - *Biology/Biomedical sciences (7 IRTG vs. 7 RTG) and Chemistry (6 vs. 7)*
 - **36.143** Publications in Scopus, authored by **452** PIs (~100%), **1063** doctoral researchers (80%)
- ▶ Analysis of IRTG proposals and RTG-Monitoring Data (2012)
- ▶ Analysis of spokesperson CVs
- ▶ Analysis of review records of IRTG/RTG re: internationalisation measures

Results: Institutions

- ▶ IRTG proposals from fewer universities than RTG
(58 vs 80 universities, 46 successful)
- ▶ Some smaller universities acquire disproportionate IRTG funding
- ▶ IRTG programme predominantly perceived as *research* funding programme
- ▶ partly also considered as strategic tool for internal institutional prioritization and/or international visibility



Results:

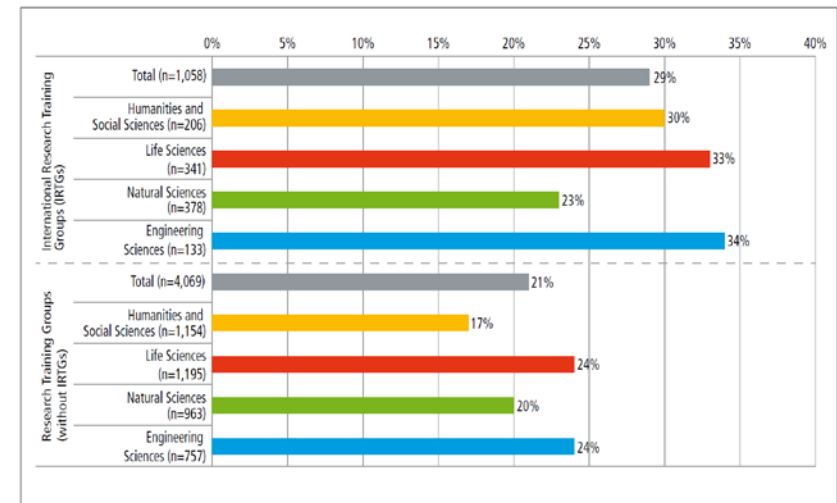
Participating researchers

- ▶ IRTG programme predominantly perceived as *research* funding instrument
- ▶ Small “cost”: Extra effort for preparation of an IRTG vs an RTG proposal deemed marginal
- ▶ Added value through new scientific cooperation
- ▶ Bibliometrics: International publications grow over time. No significant differences between IRTG and RTG in co-publications and impact
- ▶ Joint publications with partner institution: predominantly spokesperson and an “in-group”

Results:

Doctoral researchers (1)

- ▶ Recruitment: IRTG attract a different type of doctoral researcher
- ▶ Mobility phase seen as added value for scientific, personal and career development
- ▶ Length and destination of stays abroad vary, depending on project
- ▶ Research stays (perceived as) not prolonging time-to-degree



Percentage of foreign doctoral researchers by programme variation and scientific discipline

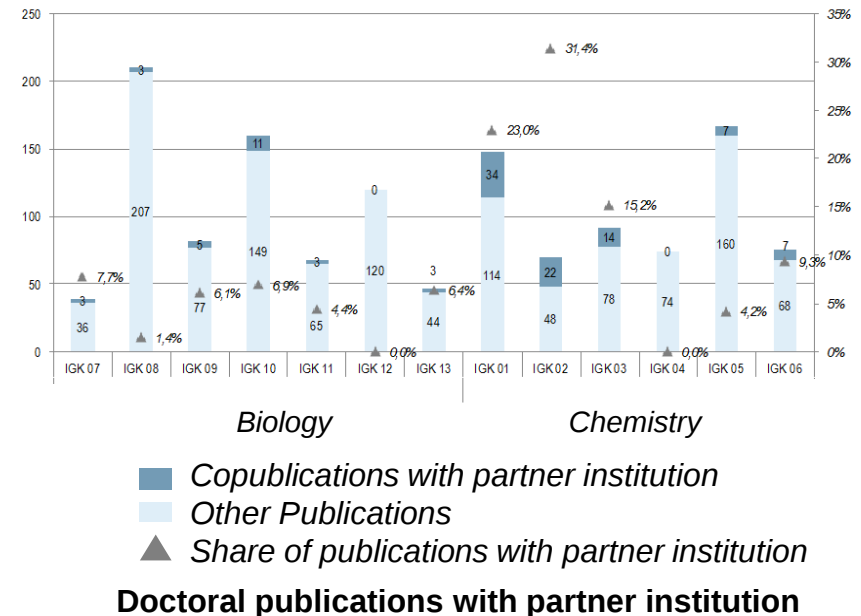
Results:

Doctoral researchers (2)

Bibliometrics:

- ▶ Few joint publications with partner institution, 0% – 30% of total output
- ▶ IRTG „alumni“: slightly higher propensity to do Postdoc abroad

Partners: some research exchange stays hindered by scarce funds and/or administrative constraints



RTG Grants Committee conclusions

- ▶ Added value for all stakeholders
- ▶ Internationalisation implemented along with (and not at the expense of) central programme goals
- ▶ „Complementarity“ needs better definition
- ▶ “Model” of internationalisation Bibliometry: contingent upon different publication strategies/cost of joint publication (e.g. authorship issues)

Open questions:

- ▶ Completion rates and time-to degree
- ▶ Long-term career development and success



Thank you for your attention!

For more information

- ▶ About the DFG: <http://www.dfg.de>
- ▶ About RTG/IRTG: <http://www.dfg.de/gk>
- ▶ About German research institutions: <http://research-explorer.de>

Funding ranking

By award amounts

IGK Rang	GRK Rang	DFG Rang	Hochschule	Geistes- / Sozialwissenschaften (Tsd. €)	Lebenswissenschaften (Tsd. €)	Naturwissenschaften (Tsd. €)	Ingenieurwissenschaften (Tsd. €)	Alle Wissenschaftsbereiche (Tsd. €)	IGK-Anteil an GRK-Mitteln gesamt (%)
1	4	5	Heidelberg U	4.824	8.650	8.735	0	22.210	36,4
2	11	3	Berlin FU	13.231	3.445	2.033	0	18.708	40,2
3	21	35	Gießen U	0	14.634	3.014	0	17.648	53,5
4	17	12	Münster U	0	3.714	11.303	1.686	16.703	45,8
5	1	8	Berlin HU	2.486	7.001	6.733	0	16.221	18,9
6	28	21	Bremen U	0	0	15.749	0	15.749	54,0
7	30	29	Bielefeld U	2.976	4.274	7.631	0	14.882	54,4
8	13	26	Berlin TU	5.406	0	8.784	0	14.190	32,6
9	32	39	Saarbrücken U	11.682	0	1.685	0	13.367	49,3
10	8	14	Tübingen U	0	5.695	7.090	0	12.785	26,6
			...						
12	5	1	Aachen TH	0	8.817	3.299	0	12.116	20,1
			...						
22	31	4	München TU	0	4.206	3.303	0	7.509	27,5
			...						
28	12	2	München LMU	5.904	0	0	0	5.904	12,8
			...						
			Gesamt	72.158	133.736	132.622	29.153	367.669	20,5

International Research Training Groups

German-Canadian IRTGs

IRTG 1705: The world in the city: Metropolitanism and Globalization from 19th Century to the present

(Berlin - NYC – Toronto, since 2011)

IRTG 1829: Integrated Hydrosystem Modelling (Tübingen – Waterloo, 2012)

IRTG 1830: Complex membrane proteins in cellular development and disease (Kaiserslautern/Saarbrücken – Alberta, 2012)

IRTG 1864: Diversity - Mediating Difference in Transcultural Spaces (Trier/Saarbrücken – Montreal, 2013)

IRTG 1901: The Brain in Action (Gießen/Marburg – Toronto, 2013)

IRTG 1904: ArcTrain - Processes and impacts of climate change in the North Atlantic Ocean and the Canadian Arctic
(Bremen – Montréal, 2013)

IRTG 1906: Computational Methods for the Analysis of the Diversity and Dynamics of Genomes

(Bielefeld – Vancouver, 2013)

IRTG 2022: ATUMS – International Graduate School for Environmentally Responsible Functional Hybrid Materials

(Technical University Munich - Alberta, 2015)

IRTG 2027: New Trends in Molecular Activation and Catalysis (Münster – Toronto, 2015)

IRTG 2078: Integrated engineering of continuous-discontinuous long fiber reinforced polymer structures

(KIT – UWO and others, 2015)

IRTG 2079: Cold Controlled Ensembles in Physics and Chemistry (Freiburg– UBC Vancouver, 2015)

IRTG 2101: Guided light, tightly packed: novel concepts, components and applications (Jena – Quebec/Toronto, 2015)

Cooperation agreements with partner organisations

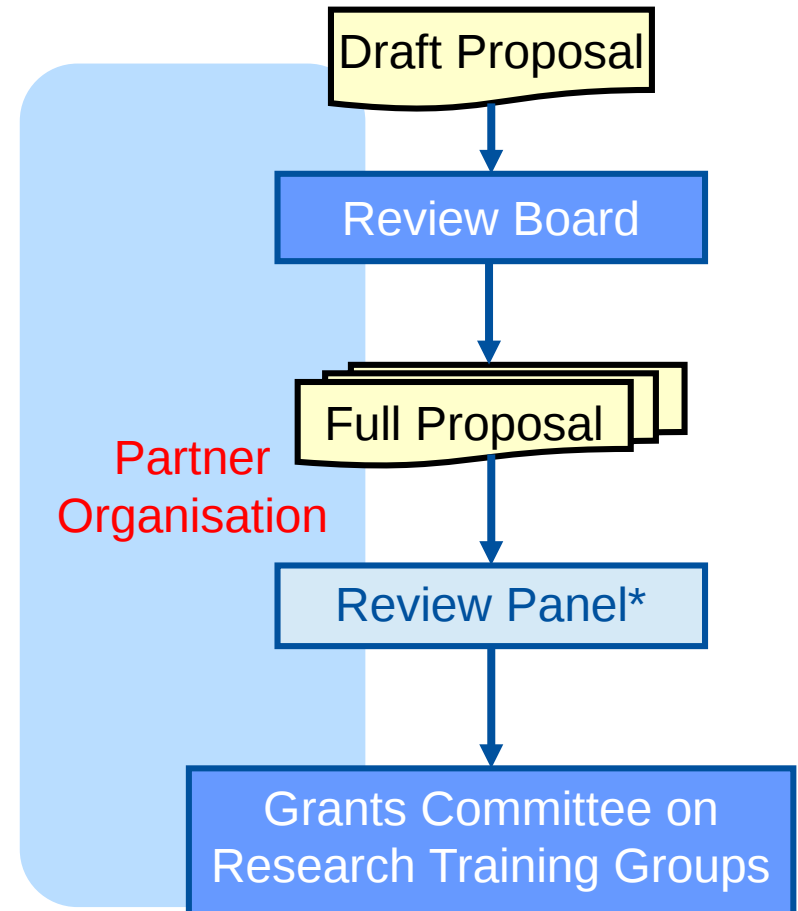
- ▶ PR China (MoE, GU-CAS) 2002/2003
- ▶ Netherlands (NWO) 1999-2012
- ▶ France (UFA, MoE) 2004
- ▶ Czech Republic (CGAR) 2004
- ▶ Hungary (OTKA) 2004/2006
- ▶ India (DST, UGC, DBT) 2004, 2010, 2012
- ▶ Japan (JSPS) – 2005
- ▶ Korea (KOSEF->NRC) 2006/ 2013
- ▶ Finland (AKA) 2006-2011
- ▶ Russia (RFBR) 2007/2010
- ▶ Mexico (CONACyT) 2009/2014
- ▶ Brazil (FAPESP) 2010
- ▶ **Canada (NSERC) 2011**
- ▶ **USA (NSF) 2014**



International Research Training Groups

Application and decision process

- ▶ 20-page draft proposal
- ▶ Recommendation by Review Board(s)
- ▶ 65-page full proposal
- ▶ panel review “on site”
- ▶ defined set of criteria
 - Participating scientists & institutions
 - Research programme
 - Supervision and qualification concept
 - Institutional integration and cooperation
- ▶ decision by Grants Committee



Graduate Schools

The 2nd funding line of the Excellence Initiative

Basic idea of the Excellence Initiative:

- ▶ Scale up the concept of Research Training Groups
 - ▶ Improve doctoral training in a comprehensive manner
 - ▶ Introduce **Graduate Schools**
-
- ▶ Same basic idea as RTG: top-level research, structured research training, quality recruitment and supervision
 - ▶ **but:** larger projects (up to 2.5 mn € /year), mostly implemented at higher organizational level of university
 - ▶ Less restrictions on use of funds (instrumentation, new staff), more freedom to shape each Graduate School



DFG Graduate Schools

Not just “more of the same”!

Research Training Groups

- ▶ Focused, coherent research programme, designed by PIs
- ▶ 5-10 PIs
- ▶ ~ 15-30 doctoral researchers
- ▶ can be class/module of GSC
- ▶ Funding ~ 700 T € p.a.
- ▶ N = **~200**

University Mainz, IRTG 1404:
“Self-organized Materials for Optoelectronic Devices”

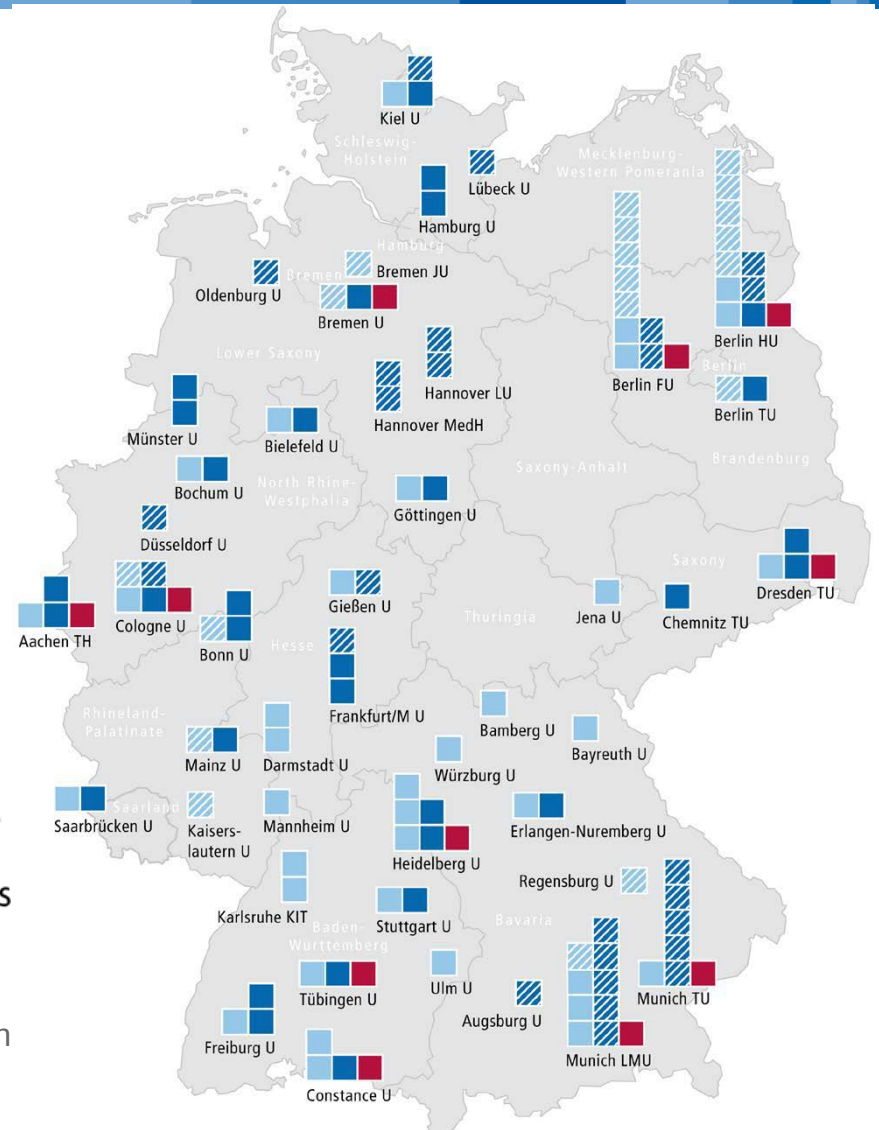
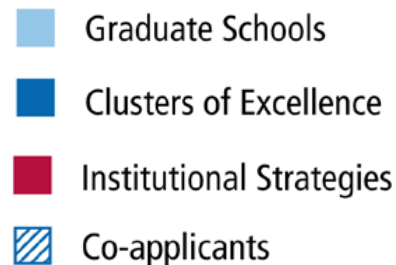
Graduate Schools

- ▶ Covers research field(s) & priorities of the university
- ▶ 25 PIs + further investigators
- ▶ ~ 40-300 doctoral researchers
- ▶ can incorporate RTGs
- ▶ Funding ~ 2.5 M € p.a.
- ▶ N = **45**

University Mainz, GSC 266:
“MAterials science IN mainZ” (MAINZ)

Graduate Schools 2006-2017

- ▶ **45 Graduate Schools currently funded**
(2nd phase)
- ▶ Successful funding programme
- ▶ „Triggering effect“ for structured doctoral programmes
 - Many universities develop and implement GSC-like structures
 - Support by state government/intramural funds



Stellungnahme des Lenkungskreises

Programmstruktur (1)

Wechselseitige Forschungsaufenthalte, Bilateralität und Komplementarität

- ▶ Promovierende und Betreuende erwarten wissenschaftlichen Gewinn von ForA
 - deutlich häufigere und längere Auslandsaufenthalte als in GRK
- aber:
 - nicht alle Doktorandinnen und Doktoranden absolvieren einen ForA
 - nicht alle Doktorandinnen und Doktoranden absolvieren den ForA beim Partner
- ▶ D.h. Zielort und Dauer werden pragmatisch gewählt
- ▶ Bibliometrie: geringe Zahl gemeinsamer Publikationen in IGK, wird nur von einigen, nicht allen Beteiligten erbracht

- Komplementarität innerhalb des IGK nicht gleichmäßig, strikt bilaterale Zusammenarbeit kann folglich nicht homogen vom gesamten Kolleg erfüllt werden

Stellungnahme des Lenkungskreises

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Stellungnahme des Lenkungskreises

Struktur (2)

Formen der Internationalisierung

- ▶ „Internationalisierung von Wissenschaft und Forschung“ vielschichtiger und missverständlicher Begriff
- ▶ Gerade für Nachwuchsförderung/Promotion ist präziseres Konzept notwendig
- ▶ „Ressourcenmodell“ hat eine begrenzte Reichweite, alternative Modelle nötig
- ▶ Effekte der IGK-Programmvariante vor dem Hintergrund insgesamt wachsender Internationalität schwierig zu bewerten. Aber: Themenbesetzung gelungen.
- ▶ Zunehmender Import von Programmelementen in GRK:
- ▶ IGK sind *Sonderform* des GRK, nicht per se durch „(höhere) Internationalität“ ausgezeichnet - sondern durch besonders vertiefte, fokussierte Kooperationen
- ▶ Typologische Differenzierung - „länderspezifische“ versus „generische“ IGK?



Vielen Dank für Ihre Aufmerksamkeit

Weitere Informationen

- ▶ zur DFG: <http://www.dfg.de>
- ▶ zum Förderatlas: <http://www.dfg.de/foerderatlas>
- ▶ zu allen geförderten Projekten: <http://www.dfg.de/gepris>
- ▶ zu den deutschen Forschungseinrichtungen: <http://research-explorer.de>