

Creative Regions: Regional Analysis on Future Trends for Digital Creative Industries in Baden-Wuerttemberg / Germany

No.1 of 4 reports
Baden-Wuerttemberg – Rhône-Alpes – Regione Piemonte – West Midlands

Report prepared by MFG Baden-Wuerttemberg mbH



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The creative industries are a key sector in the Europe of tomorrow. They are developing and evolving rapidly. A crucial driving force for this development is ICT technologies. Using innovative IT solutions in growing areas of the creative sector – such as advertising, digital media, games and interactive design – opens up manifold competitive advantages for research, development and business.

Since March 2008, the CReATE project consortium has been developing strategies to improve cooperation at both regional and European levels to enhance the innovative capabilities of small- and medium-sized companies from the creative sector. The CReATE consortium is led by MFG Baden-Wuerttemberg and comprises besides the Steinbeis-Europa-Zentrum (SEZ) from Stuttgart European partners from Piemonte (CSP, PTO, Regione Piemonte), Rhône-Alpes (Imaginove) and West Midlands (AWM).

Regional Analysis and Definition of Regional Research Priorities
Interim report on regional analysis
Baden-Wuerttemberg

Deliverable 2.1

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CReATE – Creating a Joint Research Agenda for Promoting ICT-Innovations in Creative Industries across Europe
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CReATE**Creating a Joint Research Agenda for Promoting ICT-Innovations
in Creative Industries across Europe**

Support Action

Analysis, mentoring and integration of research actors

Work Package 2:

Regional Analysis and Definition of Regional Research Priorities

**Deliverable 2.1:
Interim report on regional analysis
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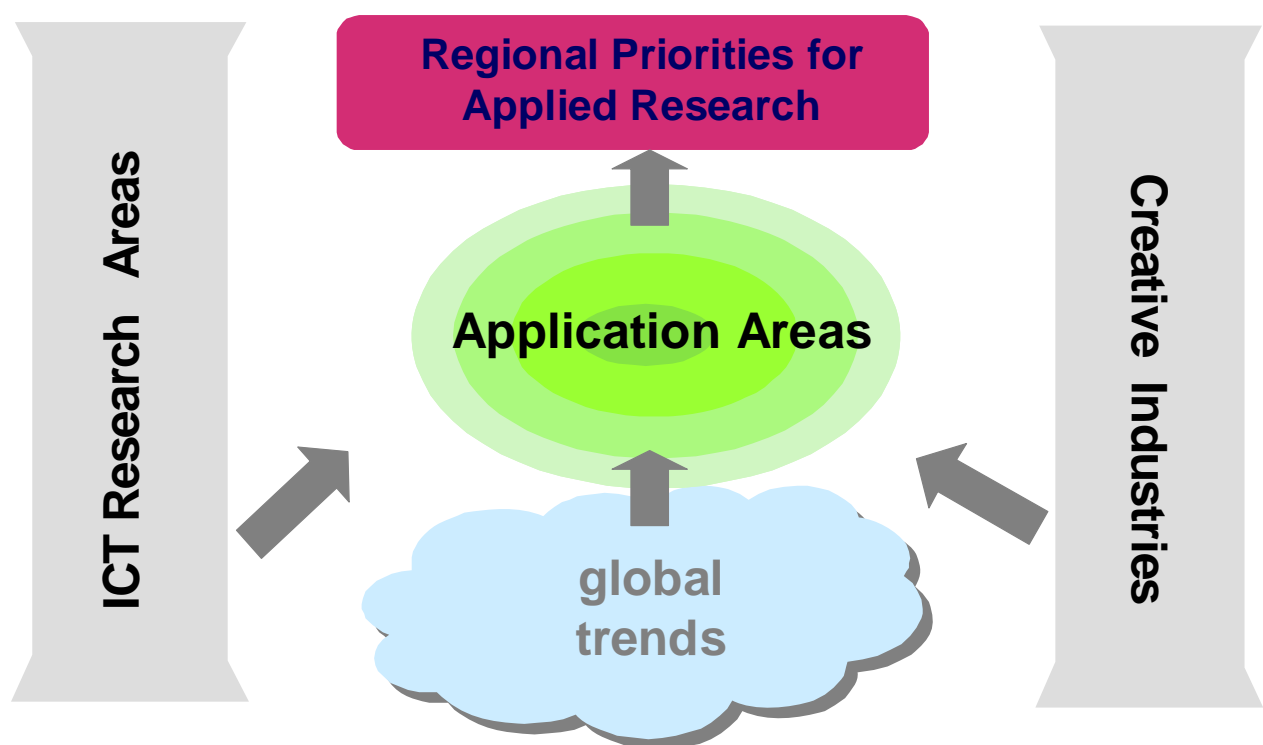
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Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

Preface

This interim report on regional analysis summarizes the regional results of the activities outlined in the Template for Regional Analysis (Deliverable 1.3). The regional results ‘animate’ the CReATE model for each CReATE region and thus build the basis for the creation of the interregional / inter-cluster Joint Research Agenda.

The CReATE model:



The following two Chapters outline the results, which are relevant to ‘animate’ the CReATE model step by step.

Chapter 1 describes the regional knowledge base on ICT for Creative Industries and specifically marks the two pillars of the CReATE model.

Chapter 2 comprises the Regional Research Priority Areas, which are based on the two pillars specific to each region, deduced from global trends and manifested in tangible and promising application areas.

1. Regional Knowledge Base on ICT for Creative Industries

This report rests upon several profound sources, which were combined in order to depict a capacious regional knowledge base on ICT for the Creative Industries in Baden-Wuerttemberg. The sources were identified throughout different approaches:

Inceptiently **statistical data** was gathered from a study by MFG Baden-Wuerttemberg mbH based on VAT statistics of Baden-Wuerttemberg from 2006.¹ The study „Umsätze und ihre Besteuerung 2006“, published by the Statistical State Agency (Statistisches Landesamt Baden-Württemberg) in 2008, served as a sound basis of information as well.

Preliminary **interviews** were held with regional stakeholders in ICT and Creative Industries, thus identifying strengths and needs in the region.

Additionally the **longtime expertise and widespread networks** built up by MFG projects and activities supplied further input. Counted among those are eminently

- Cluster Visual Computing Baden-Wuerttemberg
- FAZIT – Regional Foresight and Research Project for Current and Future IT and Media Technologies and Their Use in Baden-Wuerttemberg
- bwcon (Baden-Wuerttemberg: Connected e.V.) – Business Initiative with an Interest Group on Creative Industries (e.g. series of events “Kreativität vor Ort” and Special Interest Group “Social Media”)

Furthermore a **questionnaire** on competences and future trends for Digital Creative Industries in Baden-Wuerttemberg was conducted in January 2009.

Eventually the two **CReATE stakeholder workshops** conducted in Stuttgart in March 2009 provided important insight and data. Besides the promising results an ample need for interdisciplinary exchange could be observed empirically.

The conflation of the aforementioned complex data led to new insights concerning the current sectoral trends and thus to the establishment of a regional knowledge base covering both ICT and Creative Industries. Therein the manifold core competencies and requirements are illuminated, ready to be matched and merged with those of the other CReATE regions.

¹ Haasis K, Döbler, Th (2007): MFG Innovation 01. Informations- und Medienwirtschaft in Baden-Wuerttemberg.

1.1 Key cluster stakeholders relevant for the CReATE activities

Creativity in Baden-Wuerttemberg follows a tradition of decades. The region is famous for its innovative strengths and creative energy. From start-ups via SMEs to global players: all industries offer the capability of creating tools and services for the Creative Industries, providing an upcoming generation of digital natives as well as early adopters and digital immigrants with inventive products. The fertile framework conditions and boosting business environment within the region offer creative actors and experts a habit throughout the most varying branches of economy and commerce.

The identification of key cluster stakeholders relevant for the CReATE activities is a non-finished process. The following list mirrors a selection of potential partners, that is taken from the wide range of Creative Industries in Baden-Wuerttemberg.

N	PLAYER, ORGANISATION, ENTERPRISE NAME	SHORT DESCRIPTION	WHY STAKEHOLDER	WHICH TYPE (Research, Enterprise, PA, Development Agency, Training, Event, Other)	WEB	PUBLIC/ PRIVATE/ NON-PROFIT
1	Center for Art and Media Karlsruhe (ZKM)	Cultural institution, which combines production and research, exhibitions and events, coordination and documentation	Center for Art and Media has manifold resources at its disposal: the Museum of Contemporary Art, the Media Museum, the Institute for Visual Media, the Institute for Music and Acoustics and the new departments - the Institute for Media, Education, and Economics, and the Filminstitute.	Research, Museum	www.zkm.de	Public
2	aed Society for the Advancement of Architecture, Engineering and Design in Stuttgart	aed is an initiative founded by Stuttgart based engineers, architects and designers that aims to advance - and promote public awareness for product design and graphic design	Regional network	Other	www.aed-stuttgart.de	Non-profit
3	Pantektura	Architecture office	Very innovative company specialised on computer generated architecture	Enterprise	www.pantektura.de	Private
4	Jangled nerves GmbH	Jangled nerves is an architectural company in the field of fairs, showrooms, exhibitions, museums	Very innovative company regarding to Creative Industries (animation, information design ...) with references from i.a. Porsche, Mercedes Benz Museum, Shanghai Automobil Museum	Enterprise	www.janglednerves.com	Private

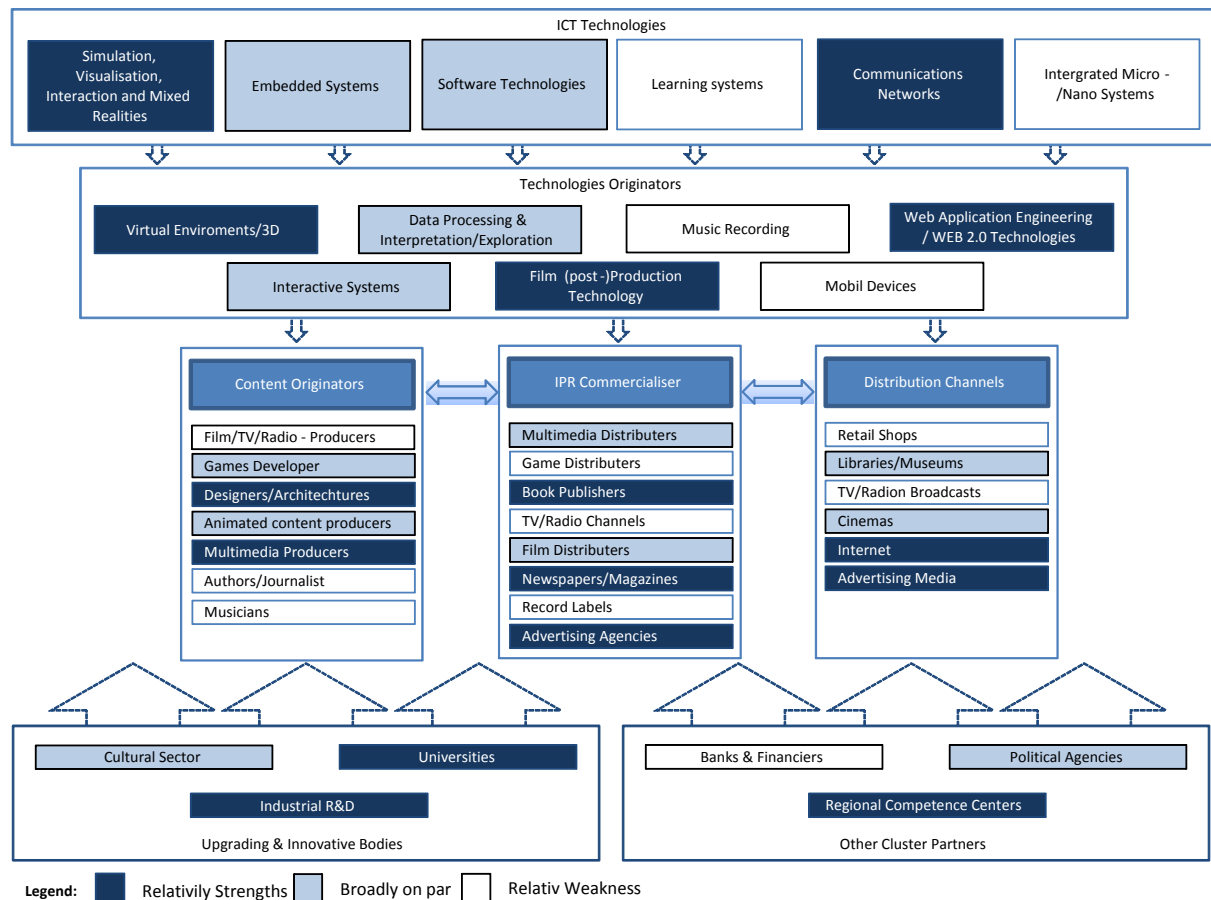
5	Werner Sobek Stuttgart GmbH & Co. KG	Architectural office providing engineering in combination with design	International well known architect, winner of many awards	Enterprise	www.werner-sobek.com	Private
6	Mackevision Medien Design GmbH	Mackevision is an international service provider in the area of 3D visualization & post production. Their core expertise lies in the creation of visualizations of the highest quality for all media – web, film and print	Active enterprise (R&D unit, sponsoring, events) with high reputation in the region	Enterprise	www.mackevision.de	Private
7	Lumo Graphics GmbH	Lumo Graphics is an experienced software producer and project partner for successful 3D visualizations within the sales process	Member of MFG network, speaker at several MFG events	Enterprise	www.lumo.de	Private
8	MachIdee	Office for engineering services and consulting to solve highly complex problems in the world of technology	Combines engineering knowledge with the creative methods of design. Very well connected in the field of visual computing in the region	Enterprise	www.machidee.de	Private
9	Stuttgart Media University (HdM)	Stuttgart Media University educates media specialists and regards itself as a full-service university for the media industry.	Wide range of courses related to Creative Industries and ICT	Research and Training	www.hdm-stuttgart.de/	Public
10	Pforzheim University: The School of Design	Dept. Transportation Design	Very specialist school related to Creative Industries (automotive design), internationally high ranked design school	Training	www.hs-pforzheim.de	Public
11	Stuttgart Region Economic Development Corporation (Wirtschaftsförderung Region Stuttgart GmbH or 'WRS')	Central contact for investors and companies in the neighbouring counties	Strongest local Creative Industries network in Baden-Wuerttemberg	PA	wrs.region-stuttgart.de	Non-profit
12	Hubert Burda Media	International media group, host of web and radio content, television productions and direct marketing campaigns	Very active company in the fields of digital business and digital lifestyles	Enterprise	www.hubert-burda-media.com	Private
13	Ernst Klett Verlag GmbH	Publisher	One of the biggest publishers in Germany, located in Stuttgart	Enterprise	www.klett-gruppe.de	Private
14	Verband Druck und Medien in Baden-Württemberg e.V.	Association for print and media	Representative of 800 companies, with high political influence	Other	www.verband-druck-bw.de	Non-profit

15	TriCAT GmbH	TriCAT is a company which develops virtual worlds for training and collaboration / serious games	Highly innovative company, member of Cluster Visual Computing	Enterprise	www.tricat.net	Private
16	Institute of Animation, Visual Effects and Digital Postproduction	Institute of Baden-Wuerttemberg Film Academy with teaching and research programs in character animation, visual effects, games and real-time animation	Partner of MFG, host of fmx, high international reputation, winner of many national and international awards	Research & Training	www.animationsinstitut.de/	Public
17	University Konstanz, Department for Information Engineering (Computer Graphics and Media Design; Human Computer Interaction)	The department provides study and research programs in Computer Graphics & Media Design and Human Computer Interaction.	The focus is i.a. on the design, implementation and evaluation of user interfaces for various interactive devices, gigapixel visualisation. Partner of MFG/Cluster Visual Computing	Research & Training	www.informatik.uni-konstanz.de	Public
18	Trinigy GmbH	Trinigy is an company focusing on the development of advanced 3D graphics technology.	Trinigy is one of the world's leading companies in the field of 3D game engines,	Enterprise	www.trinigy.net	Private
19	IBM Deutschland GmbH	IBM Software Group, Application and Integration Middleware Software	Global Player in ICT located in Stuttgart region, R&D Unit on "virtual world" applications, 3D virtual collaboration environments, games specialisation	Enterprise, (R&D)		Private
20	Fraunhofer IAO	Research Institute for Industrial Engineering	Competence Center with specialisation on Virtual Environments and Web Application Engineering	Research	www.iao.fraunhofer.de	Public
21	Virtual Dimension Center Fellbach (VDC)	Regional competence center for virtual reality	Multiplier and technology broker, well connected with regional SME	Other	www.vdc-fellbach.de	Non-profit
22	Gameforge AG	Gameforge is a game developer for massively multiplayer online games (MMOGs)	Most successful game developers in Baden-Wuerttemberg, recently awarded as "Entrepreneurs of the Year 2008"	Enterprise	www.gameforge.de	Private
23	CyberForum e.V.	Regional high tech initiative	Well connected regional network regarding ICT	Other	www.cyberforum.de	Non-profit

24	Deutsche Thomson OGH	DTO is a global provider of services, systems, technologies, and equipment for the media and entertainment industry	Global player , specialised R&D unit on preservation of cultural heritage (film and video material)	Enterprise, R&D	www.thomson.net	Private
25	Film- und Medienfestival gGmbH	Host the international festival of animated film in Stuttgart	Hosts a very important festival of Creative Industries	Other	www.ifts.de	Non-profit
26	MFG Filmförderung Baden-Württemberg	Public agency for funding of development and production of quality films in Baden-Wuerttemberg	Central stakeholder for film funding in the region	PA	www.mfg.de/film	Public
27	SWR	Leading public broadcaster of Baden-Wuerttemberg	Central stakeholder for bpProduction in the region	Other	www.swr.de	Public
28	Popakademie Baden-Württemberg GmbH	University of popular music and music business	Very specialised training in Creative Industries (centre of excellence for all aspects of the music business)	Training	www.popakademie.de	Public
29	Baden Wuerttemberg State Ministry for Science, Research and the Arts	Decision maker regarding research policies in science, higher education and arts		State Government	mwbk.baden-wuerttemberg.de/	Public
30	Baden-Wuerttemberg State Ministry of Economy	Decision maker regarding technology and economic policies	The ministry department of innovation and technology transfer is concerned with Creative Industries	State Government	www.wm.baden-wuerttemberg.de	Public
31	Tridality Display Solutions GmbH	Autostereoscopic 3D solutions. Wide range of award winning single and multi-viewer displays; 3D software toolkits for compatibility, content creation and conversion	Highly innovative hardware (display) firm, offering solutions for new application in creative industries	Enterprise	www.tridality.com	Private
32	Motor Presse Stuttgart	Publisher of Journals, Press, papers	Large actor in the publishing industry in the region	Enterprise	www.motorpresse.de	Private
33	M.A.R.K. 13 GmbH	Animation, vfx postproduction service firm	Innovative and highly creative firm, active in regional VFX-network	Enterprise	www.mark13.com	Private

34	101 Worldwide	Marketing agency	Specialized in social media marketing, member of creative board of bwcon	Enterprise	www.101worldwide.com	Private
35	NEOS Film	Film production company	Member of MFG network	Enterprise	www.neosfilm.de	Private
36	LESC / IMI, University of Karlsruhe	Collaborative engineering / virtual engineering technologies	ICT research expert in the field of visualisation and virtual worlds	Research Centre	www.imi.uni-karlsruhe.de/	Public
37	ict Innovative Communication Technologies AG	ict offers media technology for the trade show and events sector as well as system solutions in the permanent installations sector	International system house for audio-visual information + presentation technology and in the sector of interactive multimedia applications	Enterprise	www.ict.de	Private
38	Storymaker GmbH	PR agency	Specialized in technology PR and online relations	Enterprise	www.storymaker.de	Private
39	Baden-Württemberg State Ministry	Department for IT, media and popular music	Political decision maker regarding media policies	State Government	/www.stm.baden-wuerttemberg.de	Public
40	Creativity World Forum 2009 (CWF)	Annual conference on entrepreneurial creativity; main event of the international network "Districts of Creativity", taking place in Stuttgart and Ludwigsburg;	conference will present the region as an innovative region for Creative Industries as well as to strengthen the cooperation of the Districts of Creativity / lead-managed by State Ministry of Economics together with MFG	Event	www.creativityworldforum.de	Public

1.2 Cluster map with key stakeholder groups



Source: Scottish Enterprise: Creative Media Group (1999); modified by MFG for Baden-Wuerttemberg (2008)

1.3 Key figures of the Creative Industries and ICT Research

According to the following table showing the key figures of Creative Industries and ICT Research, the strengths of Baden-Wuerttemberg lie specifically in the branches “software/games”, “architecture, design and visual arts” and “writing, publishing and print media”.² Creative services in these sectors are provided by several enterprises, easily charged and received in highest quality. Nonetheless the other fields of creative excellence can keep up the pace and flourish into successful business segments too, for instance the rapidly increasing sector “animation and computer games”. But also the other branches provide a huge number of employees and make a proportionally high turnover.

The interconnectivity of all the Creative Industry enterprises as well as the intersectoral communication between experts turn out as a prospering strength and important factor for the rise and success of the Creative Class in Baden-Wuerttemberg.

Creative Industries	
No. of firms	
▪ Music, radio and audio	1.100
▪ Film, television and video	700
▪ Animation and computer games (entertainment software)	5.500 *
▪ Writing, publishing and print media	5.900
▪ Advertising, graphic design and marketing	13.600
▪ Architecture, visual arts and design	16.800
Employees**	
▪ Music, radio and audio	7.200
▪ Film, television and video	7.900
▪ Animation and computer games (entertainment software)	68.600
▪ Writing, publishing and print media	59.600
▪ Advertising, graphic design and marketing	55.000
▪ Architecture, visual arts and design	51.200
▪ No. of freelancers (if available)	-
Turnover (in 1000 €)	
▪ Music, radio and audio	316.000
▪ Film, television and video	318.000
▪ Animation and computer games (entertainment software)	5.740.000*
▪ Writing, publishing and print media	10.558.000
▪ Advertising, graphic design and marketing	5.850.000
▪ Architecture, visual arts and design	4.387.000

² c.f. Arndt, O., Brünink, D (2009): Quantitative Branchenanalyse CReATE Baden-Wuerttemberg. Prognos study: p. 19 (appendix)

* NACE 72.22.3: Other software development

** Statistisches Landesamt Baden-Wuerttemberg and Bundesagentur für Arbeit (numbers relate to 2007, published 2009); modified by Arndt, O., Brünink, D (2009): Quantitative Branchenanalyse CReATE Baden-Wuerttemberg. Prognos study

Education ***	
No. of educational training institutions in Creative Industries	n.a.
No. of students graduating p.a. (BA, MA, PHD) in Creative Industries	n.a.
No. of study paths in Creative Industries	83
ICT Research	
No. of research institutes/labs (incl. research groups at universities)	n.a.
Number of educational training institutions in ICT	n.a.
Number of students graduating p.a. (BA, MA, PHD) in ICT-fields	n.a.
No. of study paths in ICT	143

Source:

Statistisches Landesamt Baden-Wuerttemberg (numbers relate to 2007, published 2009)

1.4 Regional needs, capacities and related policies and supporting measures

The capacities of Creative Industries and ICT in Baden-Wuerttemberg are widespread and not always selective because of the highly dynamic and cross-linked enterprises. The rise of creativity and culture becomes apparent after a scrutinizing look at the strongest selling sectors in Baden-Wuerttemberg. Right behind the automotive industry and the engineering branch both the ICT and Creative Industries close up at third place with a total turnover of 53,3 billion Euros.³

Taking a glance from an aerial perspective, the main sectors in the overall Creative Industries cluster of Baden-Wuerttemberg are **publishing, interactive design and content, games, software development** as well as **advertisement & marketing**. Furthermore, there is a particular specialisation in **visualisation** and **animation technologies** and their application in Creative Industries as well as in manufacturing.⁴

Enhancing this capacities Baden-Wuerttemberg commands a **rich cultural landscape**. Creativity combined with technology is the chief cause of the regions' sustained success. Moreover this powerful fusion causes a solid ground for regional and nationwide financial assets as well as for choice investments beyond borders.

▪ Fields of excellence

RESEARCH & EDUCATION An important bedrock of the Creative Industries and ICT in Baden-Wuerttemberg is the rich research and educational landscape. The state holds over 220 different courses of studies in the field of IT, media, communication and design.⁵

According to annual surveys, the top-ranked German IT departments are those of the Universities of Karlsruhe and Stuttgart. A strong **network of universities** of applied sciences focus on innovative technologies and applications. Among them are the HdM Hochschule der Medien (Stuttgart) – well-known as the largest media university in Europe and providing new professional courses such as “mobile media” – and universities specialised in software

*** Studienführer. Studium mit Zukunft: Medien, Information, Kommunikation (2007). Ministry for Science, Research and Arts Baden-Wuerttemberg with MFG Baden-Wuerttemberg

³ Sales tax statistics Baden-Wuerttemberg 2006; Stuttgart (2008), modified by MFG Baden-Wuerttemberg

⁴ cf. Arndt, O., Brünink, D (2009): Quantitative Branchenanalyse CReATE Baden-Wuerttemberg. Prognos study

⁵ cf. Studienführer. Studium mit Zukunft: Medien, Information, Kommunikation (2007). Ministry for Science, Research and Arts Baden-Wuerttemberg with MFG Baden-Wuerttemberg

engineering (Heilbronn), visual design (Schwaebisch Gmuend, Pforzheim), media information technology (Furtwangen), computer graphics and human computer interaction (Konstanz) as well as computer science (Karlsruhe). Additionally, the Filmakademie (Baden-Wuerttemberg Film Academy) with its Institute of Animation, Visual Effects and Digital Postproduction and also the Popakademie (Mannheim) have a very **high reputation** and enjoy a huge renown in the Creative Industries and ICT in Germany and beyond.

Much-cited in this context is the ZKM, the Center for Art and Media based in Karlsruhe. This cultural institution combines art and ICT in an extraordinary innovative manner. Worldwide unique the ZKM is swift to react to the fast evolution of ICT and the society being in a constant state of flux. In its work the ZKM **unifies production and research, exhibitions and events, conveyance and documentation**. Thus it stands for the interdisciplinary activities, that burgeon throughout all Baden-Wuerttemberg.

The high density of educational and research institutions shape an excellent training habitat, fortified with unique formats, that begets strong creative talents.

SIMULATION & INTERACTIVE DESIGN As aforementioned the economic competences are region-spanning. Visualisation, simulation, computer graphics as well as media and interactive design are centres of gravity in the creative universe of Baden-Wuerttemberg. Drawing on a long tradition especially in the automotive sector, the Creative Class within the region enhances traditional industrial sectors with new services. The mere manufacturing is still of high relevance - but the services sector amplifies the products with **innovative ideas and digital channels**. Paradigmatically the automotive and the simulation industry go hand in hand together, as today arises a new need for artwork in diverse application fields concerning marketing and sales. A very appreciable example of an enterprise offering such creative services with respect to ICT is Stuttgart based company Jangled Nerves, which focuses on media space design. Their multimedia exhibitions contain the full creative range, from architecture, graphics, film, print and text to illustrations, interactive services, computer animations and tangible, mutable objects. Standing for several ICT enterprises in this field of competence the employees yield a **broad interdisciplinary diversity**. With this innovative business strategy and workforce the enterprise won numerous pitches and projects, for example the realisation of a media installation at world famous Porsche-Museum or the touring exhibition "Bionic Car" by car manufacturer Mercedes Benz. The latter has been awarded with the prestigious red dot award.

3D ANIMATION & VIRTUAL WORLDS Regional experts also operate at full capacity in the fields of 3D animation and virtual worlds. New visual experiences are eagerly-awaited by digital users. Appealing animations and 3D internet solutions can recently come up to this expectations, thus tapping and developing new target groups. A considerable number of enterprises throughout Baden-Wuerttemberg breaks into this new markets. A rich and complex syndicate is provided in the form of the **Virtual Worlds & Games Lab**, provided by the MFG Baden-Wuerttemberg. This unique innovation hub is just one concrete example, where creative research in this fields is conducted, in this case by 20 universities and institutions, thus providing trend-setting results for further applications. Additionally a strong network of enterprises dominate the state-of-the-art research and products in the arising 3D branch. Exemplary for further illustration of regional competencies is MACKEVISION, the firm reputed to be worldwide leading in the sector of 3D visualisation, animation, visual effects and postproduction for agencies, film production companies and customers coming from the industrial sector.

Several other firms – some of them mentioned in the CReATE stakeholder list above – enjoy international reputation and set new standards in 3D animation and virtual world concepts regularly. The overall regional strength in this field is underlined by a questionnaire on competences and future trends for Creative Industries (conducted by MFG): 90% of the queried ICT experts in the region perceive competencies in simulation and visualisation.⁶

GAMES TECHNOLOGY State-of-the-art in the eLearning and educational sector are **serious games** in Baden-Wuerttemberg, where a dense enterprise network meets with a ready market. The same applies to the whole **gaming sector**, that grows in double figures throughout Germany.⁷ Next to the economic pertinence of this increase there clearly is a cultural dimension as well, elucidating the importance of digital games as a prime medium of today's youth.

Regional residents acting successful worldwide are the likes of Gameforge, Acony, Spellbound or TRICAT. Particularly the former enterprise based in Karlsruhe attracts attention. Defying the recent economic crisis 200 additional employees were recruited as has been communicated in February this year, just three months ago. There is also a direct link to the Animation Institute, that conducts experiments on using game engines for animation tools. Another convincing proof of the advanced, trend-setting combination of creativity and technology and the rich innovative infrastructure in the region.

MFG has recently established the innovation programme **Digital Media**. This programme aims at fostering digital media in Baden-Wuerttemberg and position them at an international level. Within the full range of this sector, MFG mainly addresses digital games, serious games, virtual worlds, animation and mobile applications. Special emphasis is placed on the interdisciplinary collaboration between experts of digital media and traditional media, e.g. film and books. The programmes' focal point lies in the digital gaming branch of southwestern Germany.

The three aforementioned fields of excellence provide a sales turnover of 37% in Baden-Wuerttemberg with respect to the six sub areas of the CReATE sectors of Creative Industries.⁸ They all were featured at the fmx/09 with a separate sub-congress at the premier conference for computer animation, visual effects, games and digital media in Stuttgart in May 2009.

FILM, ARCHITECTURE & DESIGN Concerning the film industry there is a strength in **digital postproduction** as well as **special effects for cinema**. Young talents face a variety of educational programmes, like internationally commended Filmakademie Ludwigsburg. In this talent pools creative force is combined with modern ICT infrastructure. Next to the rich training landscape, the fully qualified graduates as well as aspiring students find solid financial backing and valuable advisory support through the MFG Film Funding, that supports film productions for both cinema and television. Affirmative actions in focal fields in this Creative Industry sector are conducted: from scriptwriting to production and digital content funding.

Likewise cinematic is the unique landscape in Baden-Wuerttemberg. Its valleys and hills are just one of many reasons, why **architecture** in the state inherits a world famous reputation. The state has always been identified with a strong tradition of impressing, outstanding architecture and inherits famous design and architecture flagships.

⁶ "ICT Innovations in Creative Industries" – Regional questionnaire conducted by MFG in January 2009 in the frame of EU project CReATE

⁷ Study conducted by BITKOM (April 2009): http://www.bitkom.org/de/presse/58990_58965.aspx

⁸ Arndt, O, Brünink, D (2009): Quantitative Branchenanalyse CReATE Baden-Württemberg. Prognos study.

The Weissenhofsiedlung, a residential estate built in the tradition of Bauhaus in 1927, is known as one of the early highlights. Planned as an international showcase with architectural authorities by the likes of Richard Doecker, Le Corbusier, Adolf Gustav Schneck and Walter Gropius, later became globally famous as the international style of modern architecture.⁹

Looking at nowadays architectural scene, Werner Sobek is considered the virtuoso nonpareil. His oeuvre covers constructions like the new Porsche-Museum or the Kunstmuseum in Stuttgart. Internationally cross-linked he works with well-known architects, from Norman Foster to Dominique Perrault or Renzo Piano, creating skyscrapers, airports, museums or office complexes. Lateral thinking excels his projects, as every year one residence is planned, which serves as a playground and **showcase for new technologies**. That way creativity and innovation manifest themselves in the midsts of society.

PUBLISHING Furthermore two trend-setting domains are covered by expertise in **digital law** and **high value content** (e.g. in **publishing & print media**). Both are intertwined with the emerging corporative and economic digital shift, that as of now globally modifies the ways and paradigms of our society. The search for information and particularly quality content sprawls within every social class. Fittingly 41% of the creative workforce in Baden-Wuerttemberg account for writing, publishing and media.¹⁰ Moreover the MFG questionnaire clearly shows, that every second regional Creative Industries expert rates the regional print media as a field of competence.¹¹ Deriving from a long tradition it does not come as a surprise, that writing, publishing and media generate 39% share of sales in the CReATE branches and can therefore be considered as the sector with the highest turnover in whole Baden-Wuerttemberg. A good performance compared to the national standard value of 31%. The regional enterprises of this economic sectors translated 10,6 billion Euros into profits in 2007.¹²

Established media companies – book and journal publishers as well as innovative multimedia and interactive agencies – shape the publishing landscape. Klett Group, Georg von Holtzbrinck, Pons and Hubert Burda Media Holding are just a few of the prestigious provider in this **economically important sector**. But also various little publishing houses are located in Baden-Wuerttemberg, especially in the segment of specialized journals.

ADVERTISING & MARKETING An impressive 22% turnover is pulled in by a versicoloured, varied agency scene. From specialized suppliers for various multimedia and interactive solutions to the full service provider: the interaction and cooperation between the technological and creative forces in the region are characteristic and foster the **constant success of this sectors**. The share of sales amounts to an impressive 5,8 billion Euros.¹³ Furthermore the local agency landscape won plenty awards and provides four of the ten finest design agencies according do ADC Kreativranking 2008: Jung von Matt, strichpunkt, I_d buero and Professor Uli Cluss.¹⁴

⁹ Wikipedia: http://en.wikipedia.org/wiki/Weissenhof_Estate [13.04.2009]

¹⁰ Arndt, O, Brünink, D (2009): Quantitative Branchenanalyse CReATE Baden-Württemberg. Prognos study: p. 29

¹¹ “ICT Innovations in Creative Industries” – Regional questionnaire conducted by MFG in January 2009 in the frame of EU project CReATE

¹² Arndt, O, Brünink, D (2009): Quantitative Branchenanalyse CReATE Baden-Württemberg. Prognos study: p. 17

¹³ See above

¹⁴ ADC Kreativranking (2008): <http://www.adc.de/servlet/PB/show/1013964/ADC+Kreativranking+2008.pdf> [07.04.2009]

As the third biggest subsector inside the CReATE branches – in terms of sales as well as of labour force – advertising and marketing provide an essential contribution to the economic development and growth of Baden-Wuerttemberg. Withal it is considerable, that the positive occupation effect in the time span 2003 to 2007 originated primarily in the economic branch of business and pr consultancy.

CULTURAL LANDSCAPE Additionally diverse **cultural institutions and creative spaces** were established in Baden-Wuerttemberg in the last years, which enrich an already existing broad cultural scene. Museums, galleries, stages etc. now get well provided with young talents, clustering around the inspiring environments of historical buildings and inspiring architectural areas, that translate brand new opportunities of living together from mere theory to reality.

EVENTS Above that fertile cultural climate, plenty events take place in the state, covering diverse topics concerning the Creative Industries in the European Year of Creativity and Innovation (German Multimedia Congress, Future Music Camp, European Creativity Dialogue, Creativity World Forum or fmx/09, that attracted 7000 visitors from over 40 countries). This **prosperous event landscape** attracts transnational audiences and supplies especially the prevalent SMEs in the creative sector with the ample opportunity to present their services and products. Cities, regions and the state plan and often host the events mutually, thus combining their knowledge and networks for the greater effect. Coming forth from the congresses, fairs and conferences are powerful international business networks for ICT and Creative Industries. For besides the versatile programmes and speakers there are plenty of opportunities to discuss and exchange views and experiences.

- **Fields of aspiration**

Switching the focus from fields of excellence to fields of aspiration, a prior aim is to establish and secure **interoperability**. According to this, binding **digital standards** must be defined, as to facilitate the smooth usage of differing systems without any need to laboriously reformat or additionally customize data.

This also applies to the software deploy model of **SaaS** (Software as a Service), which is another field of aspiration. Since the use of the world wide web has turned mobile quickly, a great opportunity opens up for software developers as well as vendors in providing licenses web-based and on demand. Hence common applications become easily accessible for the Creative Class at reasonable costs.

Adequately supplied with all technological requirements, the focus of aspiration shifts to the software needs. Both the Creative Class as well as their target groups call for **Real-time Visualization** and **Online Integration** of contents. Whereas the first field of aspiration enables the user to digitally experience and manipulate a product from different angles, the second field provides them with web-based data, that is no longer locked up in singular hardware case and thus can be accessed without spatial limitations.

As soon as this foundations are established, other fields of aspiration present themselves immediately: **Visual One-to-One Communication** (e.g. applicable in advertising) and **Artificial Actors** (in all fields of entertainment productions, e.g. games and film industry). In either instance there is the need of detailed work-flows in creative companies, that model for instance B2B and B2C communication channels or character animation.

Regarding B2C communications, the contentwise and emotional involvement of target groups triggers innovation in Creative Enterprises. **Mass Customisation** inherits tremendous opportunities and is therefore a huge challenge for all Creative Entrepreneurs. By offering open innovation spaces on a digital basis, customers get empowered to design their own products with individualistic features, thus drawing them closer and interconnecting them to the companies. After all the file format MP3 – a perfect tool especially for the creative output of the Long Tail – has been created in Germany.

The **Internet of Things** will turn out as of major importance for the Creative Industries too. The amalgamation of the internet with the real world by means of ICT inherits whole new application areas for Creative Enterprises. Technologies such as RFID, wireless devices and real-time, location-based applications will interlink our physical world with the world wide web. This new sphere will be characterized by automatically initiated contacts, interactions and communications with objects and information.

Adding an extra dimension to this automated communication there also gleams the field of **Semantics** at the technological horizon. Grand strides are made in this new era of meaning in the world wide web. The quest for intelligent agents may prospectively turn out as a major competitive edge and unique selling proposition. This applies to Creative Companies that are both able to use semantic agents for contentual data evaluation and capable of providing others with semantic services.

▪ **Future prospects**

Overall the **raise of awareness** for the regional creative forces and competences is one important and vital component of future prospects. Some of the creative branches should gain more support, funding and not least encouragement to dive into their vivacious ideas and to put them into action. This specifically applies to those that are not numerous enough in our region.

Translation problems between the Creative Class and ICT entrepreneurs are an imperative challenge for the next years. Hence inventive thoughts are generated in milieus of imagination and often non-conformism, the creative output is rather unstructured and not defined in rigid, inflexible processes. Exactly these processes are a natural must in information and communication technologies to secure constant quality. Supplementary to contentual translation support the **fostering of cross-linkage** between Creative Industries and ICT industry must be pursued.

The new forms and multiple channels of digital sociality constitute amplified cross-functional and cross-border collaborations that are exempted from any spatiotemporal limitations. Concerning this, new digital workspace should be provided for **collaborative content production**, to cite just one example: online jamming in the field of music, the cooperative creative output being recorded instantaneously and spread through various channels on the spot.

Another future prospect lies within **pursuing the value chain**. Concretely this could be converted by bringing the opportunities of virtual worlds and serious games into market use. Besides there are several research findings throughout every single creative branch that must be pursued in order to make it ready for the market and commercialize the initial research results.

An important issue that must also be addressed is the clarification of creative and digital rights. Privacy protection and **intellectual property** (IP) will dominate the discussion of

applicability and a future society, as cultural products and services represent final goods of substantive working hours. The creative outcome deserves of protection in all respects. And furthermore the invested time is worth to be acknowledged and rewarded through a yet to be specified form of salary for the Creative Class.

▪ **Regional policies and support measures:**

MFG Baden-Wuerttemberg has a number of instruments in place to support the IT- and media sector, and which aim to facilitate the overall Creative Industries as well. These are exemplarily and selectively listed:

- the KSS Scholarship for talented students;
- the Heidelberger Innovations Forum for technology transfer and the commercialisation of research results;
- the cluster programme KREATEK to support the emergence and interconnectedness of regional cluster initiatives;
- the activities of the Cluster Visual Computing and the associated international congress/fair “fmx” (2009 also a dynamic hub for representatives of the CReATE Consortium: overall seven attendees from the regions West Midlands, Rhône-Alpes and Baden-Wuerttemberg);
- the professional education and qualification programme (MFG Akademie) and
- the annual congresses “do.it conference” and “Deutscher Multimedia Kongress”, in the course of the last mentioned the “Deutscher Multimedia Award” is prized to exemplary online and offline applications since 1996 and is considered one of the branch's most renowned awards.

The establishment of a regional Creative Industries cluster named “Kreativland Baden-Wuerttemberg” is planned for 2009 (supported by MFG and State Government) and currently evaluated by MFG.

MFG Filmfoerderung Baden-Wuerttemberg funds the development and production (e.g. scriptwriting, pre-production, incentive funding, production as well as rental and distribution) of quality films in Baden-Wuerttemberg.

Further state governmental programs for film/media sector and creative industry are:

- Film conception policy for film funding and support policies by State Government
- Cluster for Postproduction and VFX (funded by State Government and public broadcaster)
- Stuttgart Region Media Initiative funded by Stuttgart Region Economic Development Corporation (WRS)
- LfK (Landesanstalt für Kommunikation) funds broadband and internet-related projects
- Film Academy Baden-Wuerttemberg initiated by State Government in 1991
- Pop Academy Baden-Wuerttemberg initiated by State Government in 2003

Further regional policies and support measures are:

- Media Forum Freiburg (NGO)
- aed Society for the Advancement of Architecture, Engineering and Design in Stuttgart (NGO)
- architectural association (NGO)
- Association for Print and Media (NGO)

Baden Wuerttemberg is a member of Districts of Creativity and will host the next World Creativity Forum, taking place in Ludwigsburg/Stuttgart from 30th November to 3rd December 2009. MFG will host this main event together with the State Ministry of Economy. The CReATE team Baden-Wuerttemberg will establish and organize the CReATE dialogue taking place during this international event.

1.5 Strengths, Weaknesses, Opportunities and Challenges (Threats)

	Positive Factors	Negative Factors
Internal Factors	<p>STRENGTHS</p> <p>Fields of excellence:</p> <ul style="list-style-type: none"> - Visualisation and simulation (networks) <ul style="list-style-type: none"> - Computer graphics and media design - 3D Animation - Virtual worlds - Serious games - VFX / Digital postproduction for cinema - Architecture and interactive design - Publishing (print media) - B2B marketing / PR / communications <p>High density of educational and research institutions: 220 courses of study in the fields of IT, media, communications and music. Outstanding education in product design and film making.</p> <p>Powerful business networks for ICT and Creative Industries e.g. bwcon (rewarded as Germany`s best competences network 2008), CyberForum, WRS</p> <p>Strong image of Baden-Wuerttemberg as ICT location esp. in the software branch (e.g. global players such as IBM, SAP, HP based in the region)</p> <p>Prosperous ICT-event-landscape (fmx based in Stuttgart as the international event for animation and visual effects)</p> <p>Design/architecture flagships: Mercedes-Benz Museum, Porsche Museum, etc.</p>	<p>WEAKNESSES</p> <p>Lack of specific “modern” education programmes (in game development, social media and mobile business)</p> <p>Brain drain of high potentials in music and film</p> <p>Small numbers of start-ups in service industries in general</p> <p>Lack of R+D investment particular for CI / CI related fields, although BW is leading in R+D investment in Europe (4,2% of GDP, census bureau BW) Lack of financing of prototyping (especially SME)</p> <p>Weak image/publicity of Baden-Wuerttemberg for creative industries (e.g. games, advertising)</p> <p>Small number of global players in Creative Industries</p> <p>Yet little number of leading Creative Industries events</p> <p>Limited broadband infrastructure in the rural areas</p>

<p>External Factors</p>	<p>OPPORTUNITIES</p> <p>Unification of value content and new media (based on rich “analog” content)</p> <p>Cross-fertilisation: bridging the gap between engineers and creative people aiming for new applications</p> <p>“Translation” between different contexts leveraging B2B-communication competences</p> <p>New business models for start-ups and young firms enable growth without traditional intermediaries (content industries)</p> <p>Highly innovative creative services + products based on strong technological competence base</p> <p>Amount of necessary investment in technological equipment declines for Creative Industries</p> <p>In manufacturing industries, added value by creative input increases (importance of design, branding and communication)</p> <p>State-driven intermediary as facilitator for collaboration (research + SMEs; different sectors)</p> <p>Creative Industries move up on the political support agendas [EICI 2009; Initiative Kultur- und Kreativwirtschaft (Federal Ministry of Economics and Technology); Kreativland Baden-Wuerttemberg].</p> <p>Particular trends and application areas of „regional matrix“ (see page 22 ff.)</p>	<p>CHALLENGES (THREATS)</p> <p>Dominance of vertical linkages and thinking within companies/institutions and beyond prevent interdisciplinary approaches</p> <p>Financial crisis evokes shortenings on budgets regarding expenditure for marketing, fairs, creative industries products and services</p> <p>Lack of prefinancing, venture capital, funds for SME as well as funding for research projects</p> <p>Decline of student numbers + young professionals in ICT and Creative Industries</p> <p>Falling behind in high resolution content distribution due to old-fashioned networks</p> <p>Lack of viable IP-protection / IP-valuation</p>
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2. Regional Research Priority Areas in the field of ICT for Creative Industries

Methodological Note:

Based on the profound knowledge and network of the MFG innovation agency, two stakeholder workshops with over 20 experts from ICT and Creative Industries were held on 10th and 26th of March 2009. In the course of this two events both groups of participants produced diverse and versatile ideas on how ICT and Creative Industries can benefit from each other, set up new co-operations in a medium- and long-term timeframe and thus will make use of multiple forms of synergies and multi-lateral inspirations. Furthermore the mines of information made available and generated throughout the project progression of CReATE were deployed as a sound basis, ensuing an overall discussion on the most important trends and drivers of prospective advancements that could impinge on the Creative Industries from a global point of view.

2.1 Most important trends and drivers of future development potentially influencing the Creative Industries

Social

Within the last few years an astonishing shift has taken place regarding the use of **social networks**. The new paradigm of web 2.0 has entrenched, its branches ramify in diverse collaborative modes of practice. There is a clear expansion and enhancement of social networks throughout all social classes, based on the global adaptation of new technologies. This new laid and broadly accepted foundations trigger new ways of working and cooperating digitally, e.g. social gaming, online workspace, virtual classrooms.

Prospectively the digital natives and immigrants face a strong growth of **silver surfers** participating in the world wide web around the globe. Simultaneously an overall obsolescence of users will change the needs and demands of future target groups as well as the structure of market segments.

Next to this societal developments, **mobility and ubiquity** will shape the recent and future decades. The demand for mobile devices arises with the nomadic use of data. Portable ICT solutions contain the force to obtain information anytime at any place, and thus empower users to compose their personal knowledge portfolio en route.

An integral part in creating this portfolio are images, which impact on human information processing and absorption increases rapidly. Living in a meanwhile distinctive iconic culture densely populated by signs and symbols, which lead us along the (data) highway, the mere **power of images** influences people in their ways of thinking and acting.

Furthermore another future trend and driver is the **liberalization of knowledge** through new digital channels. By way of illustration the ongoing discussion about open content - open access is just one given example out of the science sector for what concurs in society everyday right now.

Besides this promising trends and drivers one must also consider the increasing **unemployment**, let alone the masses of employees that are cut off of digital access and thus important sources of profound knowledge.

Technological

The technical improvement of various spheres took place in the near past at a pace not known and achieved before. An important driver for the future of Creative Industries are in this context the establishment of **seamless standards** and avatars/digital identities, that can move

from platform to platform, completely free from media disruptions. Auxiliary visual experience will undergo a huge enhancement with **all-stereo 3D visualization** and **non-photo-realistic rendering**. Fully equipped with this technological possibilities the users can convert and upgrade their digital work- and lifestyle, for example by means of participating in **living labs**, that recently pop up all over the world – digitally as well as in the real life. This labs function as online collaboration and innovation platforms, fusing cross-border cooperation and creative ideas.

Two further important drivers have the makings of melting creativity with technology. Firstly **location based-services** will expand over the globe, using geological data, enhancing mobility and interlinking users in real-time. Secondly the exchange of considerably larger amounts of data will be customary to people. By the use of new technologies in grid computing, e.g. **cloud computing**, the users can retrieve new services (such as live streaming in highest quality) and participate in collaborative file generation.

But also the borders between humans and computers are starting to melt. **Man-machine-interaction** will conceive upgrades, that show all kinds of improvement in terms of usability regarding (age-)friendly interfaces and technologies. Not neglectable are the huge progresses made within the field of interacting devices, drawing near the **internet of things**, where machines and gadgets communicate with each other autonomously and detached of any human manipulation. Overall the growth of **intelligent infrastructure** plays a key role in the future of society.

While the apparatus carry out organisational tasks and duties, people gain spare time, that they can prospectively devote to serious and social games, as the **gaming industry** will develop with great strides. It is likely that people will not use all their additional time in front of the monitor, but also outdoors, where they could face new modes of urban development: Redrawing boundaries in what is feasible, **interactive architecture** has the potential to hit the streets and alter the immediate sociological environment to a multilogue, to a many-to-many-discourse.

Economic

The expansion of **cross-sector-business** is a dominant feature of the digital era. New target groups are exploited in the world wide web, and new online business models tap the **long tail** market. This digital revolution is accompanied by the fundamental alteration of net product right through to **interactive value added**, using new business models such as open innovation, crowd-sourcing, social commerce (P2P), social entrepreneurship etc. Forward-looking, reamed paths of **digital distribution** will drive the sharing of dynamic content.

Moreover, the quality as well the quantity of this data will shift dramatically: improved **recommender systems** will ensure the high grade of information by utilizing the wisdom of the crowds. And based on **media streaming flat rates**, that warrant the quantitative access to information, data will be communicated remotely instead of manually, saving a considerable sum of labour force and time.

Comprehensively economised are resources in response to the recent global economy crisis. The results are **scarcity of finances and resources**, that also enterprises in the Creative Industries have to face now and in the near future. Intertwined with this challenge is the **imminent recession**, causing decreasing consumer budgets and thus lower expenses for media and creative services.

Environmental

Earth and its residents have a determinated amount of energy at command. ICT is not only useful for the Creative Industries, but also requires a seizable amount of power. Appeasing this hunger **energy efficiency** will be increased and **energy harvesting** will turn out to be a common strategy to save the planet and the inhabitants.

Political

The **rise of the creative class** and the Creative Industries is of major importance for political liability and political campaigns. Especially on economic- as well as socio-political grounds an open government with a sound yet flexible policy is inquired to meet the needs of this new powerful, creative group.

Furthermore the persistent demand for **media literacy and competence** must be satisfied, as an ongoing need for discussion and training in this field can be conceived, especially within the social stratum of digital natives. Simultaneously a fundamental **analysis of media consumption** as well as **media usage** must be conducted to gather information and react swiftly on precarious circumstances, that are most likely to appear in a variety of peculiarities. This changes invoke inevitably **adjustments of political regulations and legislation**.

Value-based factors and issues

Individualization is a primary feature nowadays and defines the ways of living and working in a post-modern society. Varied sociological aspects can be deployed on this paradigm shift, that enfolds constitutive parts of societies around the world:

Seen under a positive angle, a visible advantage is the new **pluralism of values**, that can no longer get oppressed and smoothed in times of digital freedom of speech and script. At the same time negative effects emerge. There is a tendency to **infantilization** as well as to the mere quantity of content in the web instead of high quality of information. By way of illustration: Besides blogs with journalistic pretension subsist a mass of user generated content, that does not contribute with ideas nor distinguished texts but depicts everyday life in more or less unselected words and enunciation.

The same advantage/disadvantage scale applies to the people behind their digital traces in blogs, forums and other web 2.0 applications. On the one hand the **fragmentation of the social environment** is accelerated by the tribalization of user groups and also by the time being online and thus not participating in real life relations. Especially in the time of recession, this trend intensifies and shapes into a **tendency to cocooning**. On the other hand, the unconditionally withdrawable **convergent culture** contain the risk of a globally assimilated “coca cola culture”, eradicating all regional peculiarities and distinctions. Counterbalancing this opposing tendencies, an important trend for not alone creative workers is the new need for **offline time**, respectively whole offline periods.

A particular problem especially for the Creative Industries lies within the difficulty to **verify (digital) information**. The highly creative and often not exactly definable output of the Creative Class is mostly not equipped with digital watermarks or similar evidence of the primal producer. Therefore the creators’ and spiritual fathers’ labour must be preserved against gratuitous exploitation.

Concluding with a universally valid and applicable driver of future development a momentous factor lies within the **cultural heritage**, that faces developments at a tearing pace and thus requires preservation and shelter. The course of history and historiography teaches the importance of this substantial aspect, that cultivates and shapes the **cultural identity** of mankind – a crucial challenge in times of global acceleration and interconnectedness.

2.2 Identified tangible and promising application areas (derived from the most relevant trends and drivers)

Based upon the high-impact trends, the participants developed more than 35 tangible and promising application areas of ICT technologies in the Creative Industries. The following 4 paragraphs sum up the most essential. Detailed trend-application-relations can be found in the *Regional Matrix*.

Visualization: Visualization is becoming a mainstream way of communicating information. This is because complex information is far easier to comprehend visually. The future will be the upcoming decades of the digital natives. But this also means that the expectations towards the quality of visualizations and images are and will be on very high scale. Therefore immersive visualizations combined with mixed realities and interactivity are at cutting edge for the attractiveness of entertainment applications as well as edutainment, marketing and product presentations like interactive media installations, showrooms and brand centres. Thus technologies for 3D animation, photo-realistic-rendering, zoomable object-oriented user interfaces, are critical components of visualizations for a wide range of mobile and stationary devices.

Mobile Applications: Increasingly the world wide web is used on the go. Mobile handhelds equip users with the freedom to instantly recall information at any time and any place, to recompose and upgrade them in real-time. Referring to the global trend of nomadic use of digital data, a huge new market opens up. The offer of mobile interaction, such as dynamic matchmaking, location based services and mobile social software are based on new technologies and concepts of cross-platform consistency.

Intelligent Infrastructure: Today the web provides a network of services of communication-, searching- and online- business tools, which are available across multiple devices used to access information. In order to increase the attractiveness for users as well as providers of those services, it is important to improve hit rates as well as speediness in regards of demand and supply. Here the concept of long-tail plays a central role in terms of mass media, social networks, business models as well as user-driven innovation. To meet these requirements technologies e.g. as semantic recommender systems, data mining and ambient-resources have to be further elaborated.

Virtual Worlds: Virtual worlds are not any more just a topic for computer gamers, even if gaming is still an important application area for this sector and serves as strong driver in regards of technological aspects as well as expectations of potential users. With regards to scarcity of resources in financial as well as energy matters, virtual worlds offering possibilities to collaborative tools and platforms, such as meeting rooms, design and engineering processes, training, marketing and product presentation. This evokes new and improved technologies and concepts for example concerning digital identities in order to act within and across virtual platforms, management of large data regarding its compression as well as availability in real-time, usability and aspects of interactive devices as well as visualisation like 3D and photo realistic rendering.

2.3 Agreed regional research priority areas

Regional Matrix Baden-Wuerttemberg – The first 5 rows picture the 5 most significant research priority areas (marked by asterisks):

Research Priority Area	relation to ...					Relevance for the region	Need for external partners? <i>please specify</i>	time-horizon ^{*)}	specific regional stakeholders interested in
	application areas <i>(derived from global trends & drivers)</i>	global trends & drivers	regional CI's needs & potential	regional ICT-RTDI capacities	regional policies				
Visual experience*	<ul style="list-style-type: none"> - virtual worlds - 3D-Internet - interactive showrooms 	<ul style="list-style-type: none"> - virtualization - availability of information in real-time - 3D-illustrations - photo realistic illustrations - power of visual communication 	<ul style="list-style-type: none"> - virtualization and high quality visualization of products (e.g. for sales / marketing or architectural constructions) - web-based collaborative tools / platforms (real-time 3D) - immersive environment (showrooms / classrooms / shopping-malls) - high resolution real-time 3D photorealistic rendering 	<ul style="list-style-type: none"> - pool of experts in real-time; high resolution; gigapixel; photorealistic rendering; (University of Konstanz; Institute for Animation Ludwigsburg) - expertise in collaborative engineering (VDC Virtual Dimension Center Fellbach; Fraunhofer Institute IAO; University of Karlsruhe IMI) - expertise in media design (Hochschule der Medien Stuttgart / Furtwangen University / ZKM Karlsruhe) 	<ul style="list-style-type: none"> - R&D financial support (research program for gigapixel research / BW-FIT) - cluster support program (VFX; film & digital media) - funding fmx and other events & congresses 	very high	<ul style="list-style-type: none"> - expertise in live streaming - contacts to entertainment sector industry in terms of cooperation partners and clients 	short term	
Mobility*	<ul style="list-style-type: none"> - location-based services - geo-related content supply - personalized devices / streaming - dynamic matchmaking 	<ul style="list-style-type: none"> - nomadic use - mobile content - MID: mobile internet devices - always-on-society 	<ul style="list-style-type: none"> - mobile applications of stationary content - data compression technology and high capacity networks (e.g. transmission of HD-videos) - location-based-content delivery (e.g. for marketing; value content) - seamless/open standards (e.g. for codecs, player/software) - mobile payment systems 	<ul style="list-style-type: none"> - expertise in usability engineering (University of Konstanz; University of Applied Science Esslingen) - expertise in satellite navigation/ geo-information-systems - Heidelberger Innovation Forum (mobile pay system) 	<ul style="list-style-type: none"> - upcoming study program on mobile applications at Hochschule der Medien in Stuttgart 	very high	<ul style="list-style-type: none"> - need for expertise in data compression technologies - need for mobile experts - need for experts in SEO (search engine optimisation) 	short term	

<p>Digital distribution & sharable content*</p>	<ul style="list-style-type: none"> - cloud computing / real-time / streaming - "Everything is free"- flatrate - pay-per-use (SaaS) - open content / open access - on-demand content delivery - digital libraries 	<ul style="list-style-type: none"> - on-demand content+services - digital libraries - long-term evolution (broadband networks) 	<ul style="list-style-type: none"> - enhancement of peer2 peer technologies & platforms for large data transmission, corresponding to HD-videos, graphics, models, prototypes (architecture, film, games etc.) - standardized remuneration models by global rights administration in terms of IP-protection and valuation - business process management for interfaces between print & online in publishing sector - semantic intelligent agents for searching and finding relevant and value content 	<ul style="list-style-type: none"> - expertise in viable business models for media, publishing and music sector (Hochschule der Medien & Popakademie Mannheim) - encryption - expertise in semantic technology (FZI Forschungszentrum Informatik in Karlsruhe) - expertise in data mining exploration of large data (University of Konstanz) - pool of experts in IT-related legal issues 	<ul style="list-style-type: none"> - Theseus program (national funding) - LFK programs 	<p>high</p>	<ul style="list-style-type: none"> - peer2peer business - encryption - viable business models - IP-technology 	<p>short term</p>	
<p>Open content production*</p>	<ul style="list-style-type: none"> - viral marketing / user-generated ads / individual design - on-demand and customized physical production (3D-printing) - collaborative peer production facilities: social gaming / massive multiplayer online games - intelligent recommendations 	<ul style="list-style-type: none"> - user-generated content - open innovation / online collaboration - individualisation / customisation 	<ul style="list-style-type: none"> - autonomous physical production (long tail) - mass customization with user-producer-interaction (e.g. on personal needs / content adaptation) - collaborative content creation (virtual live jamming) 	<ul style="list-style-type: none"> - collaborative engineering - visualization technologies - data mining - usability/ UI-design 		<p>high</p>	<ul style="list-style-type: none"> - web technology (online collaboration) - encryption - data compression 	<p>medium-term</p>	

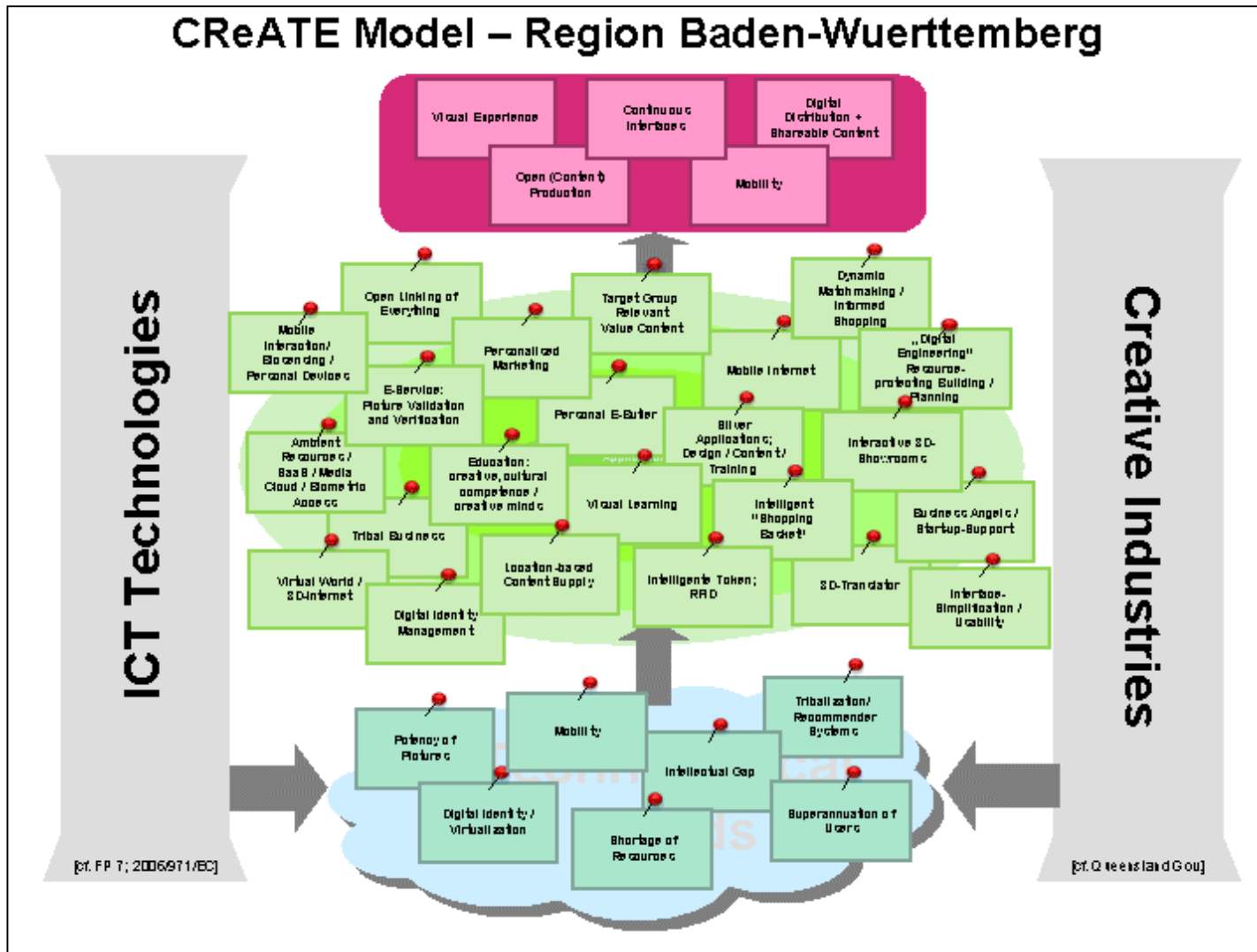
<p>Continous interfaces*</p>	<ul style="list-style-type: none"> - adaptive interaction - embedded systems and sensor engineering - audio-control - interactive service systems - GUI-usability - haptic computing - neuro controller (e.g. games) - see-through devices - emotion recognition - intuitive Uis 	<ul style="list-style-type: none"> - usability - embodied interfaces - computer-generated agents - multi-functional devices 	<ul style="list-style-type: none"> - new gaming / music instrument interfaces / controller - haptic interfaces / interaction devices (fashion, mobility, gaming) - voice recognition / interpretation as user-interface 	<ul style="list-style-type: none"> - human-computer-interaction technologies - usability / UI-design 		<p>high</p>	<ul style="list-style-type: none"> - human-computer-interaction technologies (neuro) 	<p>medium term</p>	
<p>Intelligent systems</p>	<ul style="list-style-type: none"> - personal e-butler - intelligent simultaneous translation (e.g. for e-commerce / web-design / navigator / marketing / advertising) - intelligent token 	<ul style="list-style-type: none"> - intelligent infrastructure - ambient resources - semantic web - internet of things 	<ul style="list-style-type: none"> - development of intelligent systems and artificial intelligence (a.i.) - automated recourse to real data (satellite pictures: woodland, buildings etc.) - usage in gaming & architecture - usage through data training and simulation - intelligent guide-systems / shop systems - recommender systems for publishers - RFID usage in logistics - combination of hardware & 3D 	<ul style="list-style-type: none"> - IBM, Böblingen - FZI, Karlsruhe - University of Konstanz - VIS - Institut für Visualisierung und Interaktive Systeme, Stuttgart - Tridality Display Solutions GmbH, Sr. Georgen 		<p>high</p>		<p>medium term</p>	

<p>Digital identity</p>	<ul style="list-style-type: none"> -digital identity management -open ID / single-sign-on -e-learning -games / serious games - individualized personalized marketing 	<ul style="list-style-type: none"> -virtualization -avatars -living labs -privacy -evernet -always-on society 	<ul style="list-style-type: none"> - standardization of 3D worlds - avatar construction kit - webspace in the field of games - living labs - market research -product development -mediation of media literacy -fundamental research for social science -identity protection -development of new e-learning concepts -serious games 	<ul style="list-style-type: none"> - e-learning PHs / FHs - IBM, Böblingen - iRegions - IMI, Karlsruhe (Living Labs) - Fraunhofer Institutes (security systems) -Institute of Animation at the Filmakademie Baden-Wuerttemberg, Ludwigsburg 		<p>medium</p>		<p>medium term</p>	
<p>Emergence of long tail + new target groups</p>	<ul style="list-style-type: none"> -silver "apps" -ad-games -community (personalized) marketing instruments -community specific value content (e.g. content industries: print, film, music, e.g. serious games) 	<ul style="list-style-type: none"> -tribalization -intellectual gap -obsolescence of society -global social class (elite) -global dependencies and chances (convergent culture) 	<ul style="list-style-type: none"> -quality assurance (IKT & Inhalt) -silver software & hardware in accordance with the requirements of elderly people -new utilization concepts -selective / easy usage -specialized communication concepts -contact to law schools -analysis state of the art -market research -demand analysis 	<ul style="list-style-type: none"> -several enterprises in the field of product design and web design -FH Pforzheim (design) -University of Konstanz 		<p>high</p>		<p>medium term</p>	

<p>sustainable digital lifestyle</p>	<ul style="list-style-type: none"> - simulation / virtual worlds / meeting rooms / digital engineering (e.g. in architecture or in the educational sector) - bio-sensing for identification - digital rights management / copyright protection - validation of originality of data / authenticity - energy harvesting / energy saving devices - protection of cultural heritage / storage + context linkage 	<ul style="list-style-type: none"> - scarceness of resources (e.g. financial resources as well) - green IT - intellectual property - privacy / IT security 	<ul style="list-style-type: none"> - energy efficiency - distribution + consumption of content - protection of cultural heritage - storage and context linkage - dissolving the conflict between privacy protection vs. hyper / behavioural targeting (marketing) - dissolving the conflict between openness and remuneration of creative services and products - goods and services vs. IP / DRM / copyright 	<ul style="list-style-type: none"> - THESEUS / BMWi project - Deutsche Thomson-Brandt GmbH, Villingen-Schwenningen - ZKM, Mannheim (storage) 		<p>medium</p>		<p>medium term</p>	
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*) time horizon: short term: < 2 years; medium term: 2-5 years; long term: > 5 years

Appendix



Source: Statistisches Landesamt Baden-Wuerttemberg and Bundesagentur für Arbeit (numbers relate to 2007, published 2009); modified by Arndt, O, Brünink, D (2009): Quantitative Branchenanalyse CReATE Baden-Wuerttemberg. Prognos study