



GAMES USER RESEARCH

edited by Anders Drachen, Pejman Mirza-Babaei, & Lennart E. Nacke



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Games User Research

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FOREWORD

The field of Games User Research aims to provide data-informed feedback during game development to help the intended experience of the game, created during the design process, be realised by players.

The discipline is an important part of crafting the user experience of a game and one that is vital as companies put the player at the center of their experiences. Games User Research is also a science and as a science it thrives when data is shared, methodologies are followed and improved, and knowledge is passed on.

This book provides an excellent overview of approaches toward understanding and analysing game user experiences with its extensive coverage of topics. Written by experienced user researchers from across the industry, who have all worked on the development of methods and establishment of data-supported decision-making in game development.

All the contributors and the editors are members of the Games User Research Special Interest Group of the International Game Developers Association. A group founded by a small group of pioneering Games User Researchers with a desire to grow and support the discipline. Since then it has grown to include user research, user experience, and analytics topics in general. Our group thrives on sharing and improving the essential methodologies and vital concepts of our field.

The open, sharing, nature of the discipline is something we are proud of in the sometimes-secretive world of game development. We all have the desire to help games to be awesome and to share and support each other is the way forward to achieving this goal. As such, the heart of the group has always been a place to openly share knowledge, approaches, and methodologies. We view this book has an important extension of this ethos and we hope it will be a valuable asset for both existing researchers and newcomers interested in the area.

The role of the Games User Research Special Interest Group exists is to provide and support the community. As such, we endorse and support this book as a valuable resource both for our existing members and for others interested in the area. Furthermore, if you are not a member and the content of this book interests you, we welcome you to join us. You can find us online at <http://game-userresearchsig.org/> where you can join our LinkedIn group, take part in our Discord group, and access many additional resources put together by our members.

Please enjoy the book.

The Games User Research SIG Steering Committee

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AUTHOR BIOS



Anders Drachen, PhD, is a Professor at the Digital Creativity Labs, University of York and a veteran data scientist. His multiple award-winning work in the game industry as well as in data science is focused on game analytics, behavioral analytics, business intelligence, game data mining, user experience, industry economics, business development, esports and Games User Research. His research and professional work is carried out in collaboration with companies spanning the industry. He writes about analytics for game development on andersdrachen.com. His writings can also be found on the pages of trade publications such as Gamesindustry.biz and Gamasutra.com. His research has been covered by international media, including Wired, Forbes, The Independent, Techradar, Kotaku and broadly in the gaming press repeatedly over the course of his decade-long career. He is the most published experts worldwide on the topic of game analytics, game data mining and user profiling, having authored >100 research publications on these topics. He is an editor of the 2013 *Game Analytics: Maximizing the Value of Player Data*, a compendium of insights from more than 50 top experts in industry and research. He is a former Lead Analyst for SaaS provider Game Analytics and former member of the board of the IGDA SIG on Games User Research.



Pejman Mirza-Babaei, PhD, is an assistant professor for human-computer interaction and GUR at the University of Ontario Institute of Technology. He is also the User Research Director at Execution Labs, Montreal. He has been involved with the GUR community since 2009, publishing more than 50 articles and co-organizing workshops and courses at international

conferences. He has contributed to more than 20 published commercial games, including award-winning titles such as *PewDiePie: Legend of the Brofist*, *Crysis 2*, and *Weirdwood Manor*.



Lennart Nacke, PhD, is the director of the HCI Games Group and an associate professor for human-computer interaction and game design at the University of Waterloo. He is a world-leading authority on the cognitive and emotional aspects of player experience in video games, with a special focus on physiological metrics and gameful design. He has authored more than 100 research publications on these topics, which have been cited more than 8,000 times. He can be found on Twitter (@acagamic) and is also working as a gamification and user experience consultant. He chaired the Computer-Human Interaction (CHI) PLAY 2014 and Gamification 2013 conferences, and is currently the chair of the CHI PLAY steering committee. He is an editor of multiple research journals and a subcommittee co-chair of CHI 2017 and CHI 2018. He has served on the steering committee of the International Game Developers Association Special Interest Group on Games User Research and loves the GUR community. His research group writes articles at <http://www.hcigames.com>, teaches a heuristics course at <http://gamefuldesign.hcigames.com>, publishes videos at <http://youtube.com/hcigames>, and they also tweet from @hcigamesgroup. He loves karaoke, chocolate, and beaches, not necessarily in combination.



Kati Alha, MSc, is a researcher and a doctoral student at the Game Research Lab, University of Tampere. She has been researching games from multiple perspectives, including playability evaluation, playful experiments, and hybrid experiences in play since 2008. She is interested in the design of free-to-play games and has recently studied player experiences and attitudes towards them.



James Berg is a Senior Games User Researcher at Electronic Arts Vancouver, where he has worked for nearly a decade. He has been proud to contribute to projects such as *Dragon Age™: Inquisition*, *FIFA*, *NHL*, *EA Sports™ UFC*, *Mirror's Edge™ Catalyst*, *SSX™*, *NBA JAM*, and many others. James is former chair of the IGDA

Games User Research SIG, and has been a contributor, speaker, and panelist at various conventions and conferences. He really, really likes talking about games research. He is currently leading the User Experience Research team's work for Bioware's new game, Anthem. He can be found on LinkedIn or Twitter (@JamesBergCanada).



Björn Berg Marklund, PhD, is currently working at the interaction lab at the University of Skövde, where he researches games and their place in formal educational settings. His background is in game design and the development of serious games. In his current research, he argues for more realistic and sustainable ways of creating, discussing, and researching educational games and the people that use and play them. In his work, he frequently collaborates with developers and educators working with educational games, and he has experienced both successes and failures when it comes to creating games and applying them in classroom environments. By observing how games are perceived and played by such a wide range of players (developers, teachers, and students), his work also highlights the methodological challenges involved in studying gaming behaviours of heterogeneous audiences in various gaming environments.



Steve Bromley is a User Researcher, experienced with research for both software and hardware. He was lead researcher on many of PlayStation's top European franchises, and worked extensively on the PlayStation VR headset and virtual reality games. He helped create #gamesUR, the first European Games User Research conference and created and runs the Games User Research mentoring scheme. He currently leads the User Research team at UK's Parliament.



Florian Brühlmann is a PhD student at the HCI research group at the University of Basel, Switzerland. He is a trained psychologist with special emphasis on human-computer interaction. His research interests include player experience research, questionnaire development, and statistical methods for HCI research. Among others, he has worked together with Google/YouTube in the development and validation of questionnaires.



Pierre Chalfoun, PhD, is the biometrics project manager at Ubisoft Montreal's User Research Lab since 2012. His role is to establish methodologies, supervise overall biometric studies at the lab and drive actionable results for development teams. He has a PhD in computer-brain interaction and emotional intelligence from the University of Montreal. He has the privilege of doing novel biometric work for all the brands at the studio and is excited to be part of an immensely talented and generous GUR team.



Lysiane Charest is an experienced data analytics expert currently working at Outerminds as the lead data analyst and monetization manager. With a deep knowledge of analytics for games of all business models, she has collaborated with nearly 20 studios from playtesting to live ops. Previously working at Execution Labs, she has overseen the implementation and use of analytics in multiple F2P and premium games with various independent game studios. She has a rare expertise in utilizing analytics in playtesting for premium games. Previously she was the lead business intelligence analyst at Wooworld, a virtual world for teenagers. Lysiane holds a master's in business intelligence (BI) from HEC Montréal and a degree in mathematics from Université de Sherbrooke.



Shawn Connor is a manager for Data Insights, and has been doing game analytics in various capacities for over ten years, helping studios find value in all the data he keeps insisting they should collect. He has seen the entire data life cycle from instrumentation design through analysis, and has worked across a wide array of genres and platforms.



Jonathan Dankoff is a passionate Games User Researcher with over 12 years' experience on more than 20 games ranging from huge AAA titles to educational children's games and everything in-between. He has developed many new methods and techniques to better understand and improve the player experience, and

been privileged to be a part of exciting new endeavours in UX research such as enormous advances in telemetry and biometrics. During his tenure at Ubisoft Montreal, he shipped well over 100 million units on successful series such as Assassin's Creed and Rainbow Six. Jonathan is currently the senior research manager for Warner Brothers Interactive Entertainment, leading the research group and working on a wide variety of interesting projects.



Heather Desurvire, principal and founder of User Behavioristics Research, Inc., a user-player research company, through research objectively identifies barriers to optimal experience. This illuminates the truth and provides the knowledge for designers and producers to make optimal game and product design decisions.

Ms. Desurvire is a highly experienced Games User Researcher. Uniquely publishing work on user-player methodologies, having worked on AAA titles, with many highly regarded game publishers, studios and startups on all platforms and genres. She has contributed to the body of knowledge in the field. She is also a member of the University of Southern California (USC) faculty, in the interactive media and games department.

Ms. Desurvire works with Fortune 500/100 companies, top publishers, studios, start-ups, and the US government. Companies such as Electronic Arts, King, Disney, Sega, Gameloft, Blizzard, Survios, Microsoft, Flipboard and many more entrust their user and player experience to Ms. Desurvire for optimizing player enjoyment and creating user delight.

Her user and player research methodology work is published in *Usability Inspection Methods* (Wiley & Sons, eds Nielsen and Mack), 'Principles of Optimal Player Experience' and 'New Player Experience' published in *Game User Experience Evaluation and Evaluating User Experience for Games* (Springer, 2010, 2015, respectively). Principles of player experience in mobile games and virtual reality principles VR PLAY HCI, 2018. Her extensive academic research work—over 35 papers and articles—have been presented in journals and at conferences such as the HCI, INTERACT, IEEE, and CHI. She has served on the board and a co-founder of the special interest group GUR, a part of IGDA, co-organizer of the GDC Summit for GUR and co-chaired the SIGCHI game community. She mentors many budding game designers and game user researchers.



Johan Dorell, BSc, worked at Paradox Interactive (Stockholm, Sweden) as a user researcher focusing on usability and playability. He has worked on titles such as *Leviathan: Warships*, *Cities in Motion 2*, *War of the Vikings*, *Magicka 2*, and many others. He has been part of the genesis of Paradox's in-house quality assurance (QA) department, and has extensive experience constructing new QA processes and environments from the ground up. He has talked about this topic at several conferences, such as the game QA and localization conference. For a couple of years he worked on implementing tests focused on usability and playability, and on improving upon these processes. During this research, he discovered the field of GUR and has been studying it ever since. He focuses mostly on finding tools and methods that produce reliable answers to questions from project stakeholders. In 2015, he moved to EA DICE as an associate Games User Researcher working on *Battlefield 1*.



Nic Ducheneaut is a research scientist with more than ten years' experience combining data science with insights from sociology and psychology to better understand human behaviour. His studies have informed the design of computer systems ranging from desktop to mobile and web applications (resulting in 23 pending U.S. patents and more than 50 refereed publications). His research pioneered the use of large-scale, server-side data for modelling behaviour in video games. At Xerox PARC, he founded the PlayOn project, which conducted the longest and largest quantitative study of user behaviour in *World of Warcraft* (more than 500,000 players observed over five years). At Ubisoft, he translated his findings into practical recommendations for both video game designers and business leaders. Today, as the co-founder and technical lead of Quantic Foundry, he helps game companies bridge analytics and game design to maximize player engagement and retention.



Thomas Galati is a game developer and data scientist. He is interested in creating more accessible and affordable analytics and user research solutions for independent developers.



Kathrin Gerling, PhD, is an assistant professor at KU Leuven, where she is part of the e-Media Research Lab. Her main research areas are HCI and accessibility; her work examines interactive technologies with a purpose besides entertainment. She is particularly interested in how interfaces can be made accessible for audiences with special needs, and how interactive technologies can be leveraged to support well-being. Kathrin holds a

PhD in computer science from the University of Saskatchewan, Canada, and she received a master's degree in cognitive science from the University of Duisburg-Essen, Germany. Before joining academia, she worked on different projects in the games industry.



Julien Huguenin is a User Research project manager at Ubisoft Montréal. He has been working as a Games User Researcher for Ubisoft since 2011, after graduating from a game design school. He worked in the HQ/Paris lab for more than 5 years, first as an analyst on AAA titles such as “Tom Clancy’s Splinter Cell; Blacklist” or “Tom Clancy’s The Division”, then as a team lead and manager. In 2017, he joined the Montreal-based team

to work on “Tom Clancy’s Rainbow 6: Siege”. You can find him on twitter @JulienHuguenin.

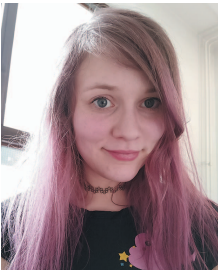


Tom Knoll is a senior user experience consultant at Spotless (spotless.co.uk), a UX and service design agency based in central London. Tom’s specific area of interest is in video games research, having worked on projects in many different areas within the gaming industry, including games usability testing, games for education, second screen experiences for broadcast TV, console hardware, and usability testing of console-

based sales platforms (such as the PlayStation store). Tom has also co-authored several research papers on the subject of strategy use by different types of gamer within video games, which have been presented at major industry events such as CHI and CHI PLAY. He retains close ties with the academic world and is always on the lookout for further opportunities to be a part of original research.



Hannu Korhonen, PhD, has more than 18 years' experience in working with issues in both academia and industry. Although Hannu has worked in many different domains, mobile devices and services, including mobile games, have been the primary area for years. Hannu has developed playability heuristics which can be used to evaluate playability of all kinds of games. In addition, he is one of the developers of the playful experience (PLEX) framework which can be used for designing playfulness in different products. Recently, Hannu completed his PhD dissertation on playability evaluation of mobile games with an expert review method.



Elina Koskinen is a philosophy student at the University of Tampere. She wrote her bachelor's thesis on ethical issues in designing free-to-play games. Elina is interested in narratives and is currently working on her master's thesis on designing ethical experiences in video games.



Ben Lewis-Evans has a PhD in human factors psychology and works as a user experience researcher at Epic Games. In addition to games, his research interests include GUR, usability, human factors, human error, traffic psychology, and science in general.



Conor Linehan, PhD, is a lecturer in applied psychology at University College Cork, where he is a member of the People and Technology research group. He holds BA and PhD degrees in psychology from Maynooth University, and until recently worked as a lecturer at the Social Computing Research Centre at the University of Lincoln. Conor's research expertise lies in the design and evaluation of technology for the promotion of health and well-being, education, and behaviour change. He has worked on diverse research projects, investigating the design of educational games, pervasive games, vision therapy programmes, sleep monitors, and online mental health interventions.



Ian Livingston is the User Experience Manager for EA Canada, where he and his team provide user experience research and tools support for multiple franchises developed across Canada including FIFA, Plants vs. Zombies, and Mass Effect. Prior to EA, Ian worked at Ubisoft Montreal as the User Research Lead for the Far Cry franchise, working on titles including Far Cry 3 &

4. Ian has been working in the video game industry for almost 9 years, has published numerous academic articles in the field of HCI, and has presented work at a variety of conferences including GDC, and SIGGRAPH.



Sebastian Long works as a Games User Researcher at Player Research, the multi-award-winning playtesting and research studio based in the United Kingdom. With Player Research, Seb has contributed to hundreds of games and impacted billions of players, including many best-loved franchises and indie games. Seb is a '30 Under 30' and Develop Award winner, BAFTA member, GamesUR conference chair; he lives on the UK south coast with his partner Kathryn.



Guillaume Louvel is a UX/UR consultant and a former Games User Researcher at the Ubisoft Editorial UR Lab. At Ubisoft, he led user tests and research on several AAA titles, as well as smaller games for consoles, PCs, mobiles, and browsers. Besides video games, his user research work includes topics such as websites, apps, serious games, and automotive user interfaces.



Regan Mandryk, PhD, is a professor in Computer Science at the University of Saskatchewan; she pioneered the area of physiological evaluation for computer games in her award-winning Ph.D. research at Simon Fraser University with support from Electronic Arts. With over 200 publications that have been cited thousands of times (including one of Google Scholar's 10 classic papers in HCI from 2006), she continues to investigate novel ways of understanding player experience in partnership with

multiple industrial and international collaborators, but also develops and evaluates persuasive games, games for health, games for special populations, and games

that foster interpersonal relationships. Regan has been the invited keynote speaker at several international game conferences, led Games research in the Canadian GRAND Network, organizes international conferences including the inaugural CHI PLAY, the inaugural CHI Games Subcommittee, and CHI 2018, and leads the first ever Canadian graduate training program on Games User Research (SWaGUR.ca) with \$2.5 million of support from NSERC.



Graham McAllister, PhD, is the founder and director of Player Research, an award-winning UX Research and playtesting studio based in Brighton, UK and Montreal, Canada. Player Research helps studios deliver successful games by challenging assumptions, validating design decisions, and providing evidence on the player experience throughout development. He has a PhD in Computer Science and was previously an academic in

Human-Computer Interaction at the University of Sussex. Graham is a BAFTA Games member, a frequent conference speaker, and has written regular columns on UX Research for EDGE GamesIndustry.biz.



Michael C. Medlock is a Principal User Researcher at Oculus Rift with 20 years of industry experience in the field of Human-Computer Interaction. Early on he worked at Microsoft on Internet Explorer 4.0 and then at Boeing on internal airplane configuration software. He then helped found the Games User Research group at Microsoft in 1998. During 10 years in the games group, he worked on three Xbox console launches and

many successful Xbox and PC games such as Project Gotham Racing, Age of Empires II, Dungeon Siege, Crimson Skies, Flight Simulator, Top Spin, Gears of War 3, Minecraft for Xbox, and Sunset Overdrive. While at Microsoft he has also worked on Windows Phone 6.0 – 7.0, Zune software, Xbox platform software, HoloLens & internal HR business systems. Additionally, he has worked on medical devices and software for Philips. He has documented and evangelized the Rapid Iterative Testing and Evaluation method (RITE) which is used worldwide, and UI Tenets & Traps, a heuristic system for evaluating user interfaces.



Elisa Mekler, PhD, is head of the HCI research group at the University of Basel, Switzerland. She holds a PhD in cognitive psychology from the University of Basel with special emphasis on HCI. Her research interests include motivational and emotional processes underlying the player experience. Her publications have won best paper and best paper honourable mention awards at the premier human-computer interaction conferences CHI and CHI PLAY.



Janne Paavilainen, MSc, is a games researcher at Game Research Lab, University of Tampere, Finland. For the last decade, Janne has been involved in research projects focusing on mobile, casual, and social gaming. Janne's research interests are in game usability, playability, and player experience. More recently, while finishing his doctoral thesis on Facebook games, he has studied the free-to-play revenue model, service design, and player experiences in social network games



Johanna Pirker, PhD, is a computer scientist focusing on game development, research, and education. She has lengthy experience in evaluating, designing, and developing games and virtual realities and believes in them as tools to support learning, collaboration, and solving real problems. In 2011–2012 she started developing virtual worlds for physics education at Massachusetts Institute of Technology. She specialized in games and environ-

ments that engage users to learn, train, and work together through motivating tasks. She started in the industry as QA tester at EA and still consults for studios in the field of GUR. At the moment she teaches game development at Graz University of Technology and researches games with focus on data analysis, HCI, AI, and virtual reality technologies. She has authored and presented numerous publications in her field.

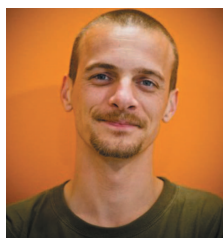


Mirweis Sangin, PhD, is principal UX researcher at Sony PlayStation. Throughout his years at PlayStation, he has been responsible for helping improve the player experience of award-winning franchises such as LittleBigPlanet, Tearaway, Killzone, and Horizon: Zero Dawn. He has also worked extensively on improving the user experience and ergonomics of systems such as PlayStation Vita, DualShock 4, and PlayStation 4.

Mirweis holds a master's degree in cognitive science and a master's and PhD degrees in human-computer interaction. Prior to his position at PlayStation, he has worked as a freelance UX consultant and as co-founder and principal UX architect of a UX design agency in Switzerland.



Steven Schirra is the UX research manager at Twitch. He has led mobile user research on games and entertainment products at Zynga, the MIT Game Lab, and Yahoo. He received his master's in comparative media studies from MIT.



David Tisserand is a process manager at the Ubisoft Montreal User Research Lab, responsible for streamlining the testing process and ensuring top-quality findings. He also manages the international standardization of Ubisoft user research processes. Previously he was a process manager at Sony Computer Entertainment Europe where he led the international research effort on the PlayStation Vita and DualShock 4 ergonomics, and worked on games such as Heavy Rain and Beyond 2 Souls.



Brooke White is the senior director of UX research at Yahoo for all consumer products and advertising platforms. She started and directed user research practices for three different companies: Yahoo, Disney, and Volition/THQ. Brooke has decades of experience spanning research, marketing, and production in desktop, console, and mobile consumer games and entertainment.



Dennis Wixon, PhD, is an associate professor in the Interactive Media and Games Division at the USC School of Cinematic Arts, where he holds the Microsoft Professorship for user research. He has worked in user research since 1981. He has worked as an individual researcher and managed user research teams at Digital Equipment Corporation and Microsoft, including the Games User Research team at Microsoft Game

Studios. He has worked closely with his teams to develop a number of applied research techniques including data logging, usability engineering, contextual design, RITE (rapid iterative testing and evaluation) and TRUE (tracking real-time user experience). Many of these techniques have been widely adopted and have become an industry-wide practice. TRUE was one of the first comprehensive descriptions of telemetry and analytics for game design and has been applied to well-known franchises such as Halo. Dennis has given talks on HCI and has co-authored over 50 articles and book chapters, and two books: *Field Methods Casebook for Software Design* and *Brave NUI World*. He has also served as papers co-chair, tutorials co-chair, posters and notes co-chair, and overall conference chair for SIGCHI. He was elected vice president of SIGCHI and focused on reforming the conference to broaden participation. He was also one of the founding members of the Greater Boston SIGCHI chapter, one of the oldest chapters in SIGCHI. Dennis has a PhD in experimental social psychology from Clark University. His current interests include research methods for game design and the application of data science to games research.



Nick Yee is the co-founder and analytics lead of Quantic Foundry. For over a decade, he has conducted research on the psychology of gaming and virtual worlds using a wide variety of methods. At Stanford University, he used immersive VR to explore how avatars can change the way people think and behave. At the Palo Alto Research Center (PARC), he applied social network analysis and predictive analytics to examine large-scale

World of Warcraft data. He was a senior research scientist in Ubisoft's Gamer Behavior Research group where he combined data science and social science methods to generate actionable player insights for different game development teams. At Quantic Foundry, he leads the research and development of new tools and approaches for understanding the motivations of game audiences. He is the

author of the book *The Proteus Paradox: How Online Games and Virtual Worlds Change Us—And How They Do not*.



Veronica Zammitto is a Director of UX Research at Electronic Arts. She focuses on strategic improvement of the UX research practice and building a world-class research team in the game industry. Veronica has extensive knowledge of research methodologies applied to video games. She has transformed how player experience is assessed at EA by introducing novel techniques, including eye tracking and mixed methods with telemetry, as well as setting processes and standards for impactful, high quality research. Veronica is passionate about corporate UX maturity, advocating user-centered practices that change the culture of the company, and building innovative research teams that drive the field. Veronica loves sharing her insights and vision of games user research. She frequently presents at top tier conferences like GDC, and has published book chapters and papers. Veronica's efforts have led games user research on multiple projects across all EA, including Battlefield, Plant vs Zombies Garden Warfare, Madden, FIFA, NBA Live, NHL, Star Wars: Battlefront.

CHAPTER 1

Introduction to Games User Research

ANDERS DRACHEN, *Digital Creativity Labs,
University of York*

PEJMAN MIRZA-BABAEI, *UXR Lab, University of
Ontario Institute of Technology*

LENNART E. NACKE, *University of Waterloo*

1.1 Focus on your players: Games User Research

Games User Research (GUR) is an interdisciplinary field of practice and research concerned with ensuring the optimal quality of usability and user experience (UX) in video games. This means that GUR inevitably involves any aspect of a video game that players interface with, directly or indirectly: from controls, menus, audio, and artwork to the underlying game systems, infrastructure, as well as branding, customer support, and beyond. Essentially, any aspect of a video game that influences the user's experience and perception of that game is of concern for an investigative GUR practice.

This makes GUR a field that interfaces with more or less every other area of game development. If game development were an ancient temple, the three biggest central pillars would be *design*, *art*, and *programming*. The majority of people working in games fit within one of these three wider areas. However, in-between these pillars would be dozens of smaller columns supporting the

roof of our metaphorical temple, with columns denoting specific processes: from hardware to audio engineering, marketing and management, all the way over to legal and contracts handling, and for that matter even catering, to make sure teams have something to eat. All aspects of game development—to some degree—interface with various other aspects (e.g., system programmers interface with gameplay designers). However, our GUR column could rather be perceived as a strong vine that has its tendrils spread across the vast majority of columns, supporting each of them at the same time, providing evidence about how each column holds together, and how it is perceived by the players. The ancient temple-and-vine metaphor accurately describes GUR's role in contemporary game development: it supports, provides evidence to act on, troubleshoots, checks, and inspires. GUR is the field that helps us figure out if the experiences we hope to give our players are what we are indeed delivering, because GUR focuses on the players and their experience playing games, and this is at the heart of all games.

In practice, GUR production revolves around delivering evidence of what players experience in a game project and uses methods from many research fields, including human-computer interaction, human factors, psychology, design, graphics, marketing, media studies, computer science, analytics, and other disciplines to deliver robust tests to assess all aspects of UX in a game. In addition, Jakob Nielsen, a famous UX visionary, once observed when attending the GUR Summit (one of the GUR community's big events) that GUR includes testing multiple players at the same time that generate 'data at true scale'. This poses its own analytical challenges to user researchers in games. User researchers in games need a comprehensive and truly interdisciplinary skill set to be successful.

Contrary to the domains of QA and technical game testing—where errors in the game code are tracked and the error-free technological execution of the game is in the foreground—GUR is focused completely on evaluating players (based on observation of them playing or otherwise interacting with the game and its components, and analysis of the data they generate). GUR practitioners rely on experience analysis and on understanding player interaction. Their objective is not simply testing the player, but improving all aspects of a game's design through building empirical evidence via experimentation and testing. How to do this in practice is an interesting challenge—games are intricate, interactive computational systems, where engagement is an important factor. Over the past two decades, much work has been exerted adopting and extending the methodologies from other fields to develop appropriate tools for GUR.

We—the editors of this book—find GUR rewarding because it allows us to reflect on design, to iterate deeply on game mechanics, and to understand the components of a pleasurable UX. However, for over a decade, GUR in the game industry struggled to find the recognition it deserves, often because its outcomes are more subtly embedded in a final product than a game's assets, like its sounds, animations, and graphics. Moreover, designers often get the spotlight when a game mechanic is experienced as extremely polished, but the refinement can be the result of a long and elaborate iteration process that involves feedback about the quality of experience. One of our colleagues, industry veteran Jordan Lynn, once described GUR as the practice of 'telling designers that their babies are ugly'. Indeed, it is the user researcher's job to critically investigate elements in a game and find the parts that do not work well together or are detrimental to the UX.

Seasoned GUR professionals describe their job as well done when they can provide game designers and other stakeholders with insight about how their designs are being experienced by players. As our colleague Mike Ambinder, experimental psychologist at Valve Corporation, once noted, GUR can be seen as evaluating design hypotheses that are created during each development cycle in a game, which is similar to the scientific method. Thus, GUR is an evidence-driven, powerful process that helps designers create better gameplay experiences by finding weaknesses in the design and structure of games across all phases of their life cycle, from early designs, through prototypes, and after launch.

GUR methods are evolving constantly and user testing is now commonplace in the games industry, which globally has an annual revenue of over US\$100 billion (outselling the motion picture and music industries combined), with billions of players across any culture and demographic. With such a massive and diverse audience, to make this industry a success, users have become more and more integrated into game development. The steady increase in the size of the target audience for games, as well as its increasing diversification, has led to a stronger need for GUR. This has brought an opportunity for the industry to innovate on different forms of play, allowing different types of interactions and contexts, and the accommodation of different types of users of all ages, intellectual abilities, and motivations. Now, more than ever, it is necessary for designers to develop an understanding of the users and their experiences of interacting with games.

A lot of people from the GUR (#GamesUR) community worked hard for more than two years to make this book happen. We hope you will enjoy it and find value among its pages. Thank you.

1.2 About this book

This book is focused on providing the foundational, accessible, go-to resource for people interested in GUR. It is a community-driven effort—it has been written by passionate professionals and researchers in the GUR community as a handbook and guide to everyone interested in user research and games. We aim to provide the most comprehensive overview from an applied perspective, for a person new to GUR, but which is also useful for experienced user researchers. We stress the term *overview*—GUR is a deep, interdisciplinary field with thousands of professionals working within it worldwide; hundreds of scientific papers are produced on the topic every year. It is not possible for one book to provide everything you need to know about GUR, but what a single book can do is provide the bird’s-eye view, introduce the contexts and methods, and provide a pathway for further self-illumination. That is not to say that this book is not practical, as the various chapters not only describe high-level concepts, but also how to work in practice with GUR methods. This book contains practical guidelines on how to conduct user research across topics such as planning, methods, lab design, mobile games, accessibility, budgeting user research, and more. The book is grounded in the design and development process, and describes which methods we use at which stages, mimicking the glossaries used in the industry and academic research today, but putting everything into context. The connection between the wider context of GUR and the nitty-gritty details of work ‘in the trenches’ is perhaps the most valuable aspect of this book.

1.3 Overview of the book

We have structured this book into a couple of sections, each focused on a specific theme. Within each theme are several chapters that deal with particular topics, or treat the same topics from different angles.

Part 1: GUR in Production (Chapters 2–6). This part focuses on the practical context of GUR in game development, meaning how we work with our players in practice to test and evaluate games, and with our colleagues to put the knowledge gained into action.

In Chapter 2, Veronica Zammitto discusses the implementation of GUR in the production pipeline. It concerns itself with two aspects. Firstly, it discusses the challenges and pitfalls involved in the execution of GUR. Secondly, it outlines best practices for applying GUR in industry.

David Tisserand outlines the benefits of designing a GUR process adequately in Chapter 3. Chief among its contributions is that it addresses the necessary steps of designing, running, and analysing a testing method. The chapter concludes with a discussion of the proper maintenance of documentation for optimization of research efficiency.

Chapter 4 presents Ian Livingston's discussion of the potential benefits of post-launch GUR. Sources of post-launch data such as live data and benchmark studies are considered. The chapter takes an in-depth look at a powerful benchmark study method, review analysis, which can be used only after your game has been released.

In Chapter 5, Graham McAllister presents the different maturity levels that GUR can take depending on the studio. Given the wide variety of reactions to UX, it is important to understand where one is on that maturity scale. This understanding has the potential to help developers and user researchers focus on players.

In Chapter 6, Sebastian Long contributes processes for setting up functional lab environments. It outlines the process used by Player Research to set up their labs. In so doing it provides a range of elements to consider, including testing strategies, materials selection, and floor plans. Key lessons learned by Player Research along the way are discussed.

Part 2: Methods: Testing Things You Play (Chapters 7–19). This part focuses on the myriad methods used in GUR. From interviews to analytics, GUR professionals have a big toolbox of methods and techniques that are useful in various situations. Some of these, like think-aloud testing and observation, are time-honoured, flexible methods that can be picked up and used with little training and applied in a variety of scenarios. Others, such as psychophysiological measures, are more specialized and have a narrower focus, but are incredibly powerful for driving particular types of insights.

Chapter 7 functions as an index of common GUR methods. Michael C. Medlock gives small summaries of the methods and then discusses considerations for constructing and combining them. The chapter concludes with an exploration of how to match methods to the questions they can answer.

In Chapter 8, Graham McAllister and Sebastian Long give in-depth description of the eight most used methods in player research. Information is given about time frame, execution, and result delivery. Strengths and weaknesses of each method are discussed.

Chapter 9, by Florian Brühlmann and Elisa Mekler, is about surveys. It describes the qualitative method and presents practice-oriented guidance about

when to use it. How to alleviate bias and make good questionnaires is also covered, with an emphasis on maintaining data quality.

Steve Bromley discusses player interviews in Chapter 10. Interview tips are provided as well as an exploration of the preparation of an interview as well as methods used in GUR such as interviews during the session and final interviews. The chapter ends with a discussion of data capture analysis and thoughts on the future of interview methods.

In Chapter 11, Mirweis Sangin talks about the player experience. It discusses methods applied in observing player behaviour to uncover usability problems. Furthermore, it provides an overview on how to capture usability events. Guidelines on tools and processes used to document and analyse observations are provided.

Tom Knoll describes the think-aloud protocol and its application to player experience in Chapter 12. It covers what the protocol is, when to apply it, how to conduct it, its pros and cons, and its variations. The chapter concludes with a discussion about think-aloud protocols with children and considerations necessary when using child participants.

Chapter 13 by Michael C. Medlock outlines the rapid iterative test and evaluation (RITE) method. At the heart of this method is the idea that if an issue is found, it should be fixed before the next tester plays the build. The chapter outlines the benefits and practical methodology of running RITE tests. It concludes with a discussion of the original 2002 case study which documented the method, *Age of Empires 2*.

In Chapter 14, Heather Desurvire and Dennis Wixon present PLAY and game approachability principle (GAP) heuristics for game design. It discusses the history of heuristics in games, including the research demonstrating their effectiveness, as well as describing the use of heuristics. The benefits of heuristics, such as revealing problems, fixes, possible enhancements, and effective current aspects are also discussed. Overall, heuristics have been found to be more effective than informal reviews.

Janne Paavilainen, Hannu Korhonen, Elina Koskinen, and Kati Alha talk about the heuristic evaluation method with updated playability heuristics in Chapter 15. It presents example studies identifying playability problems in social network games. Benefits such as cost-effectiveness and flexibility are also discussed. Finally, new heuristics for evaluating free-to-play games are proposed.

Chapter 16 summarizes a decade of Lennart Nacke's work on the use of biometrics for GUR, with attention given not only to the physiological justification for

the different types of biometric data that are possible to capture, but also to some use-cases and caveats to be aware of.

In Chapter 17, Pierre Chalfoun and Jonathan Dankoff describe biometric procedures, particularly eye tracking, for GUR in production teams. It is divided into four sections and describes the ongoing efforts to incorporate biometrics into video game production. The challenges and benefits of these procedures are discussed. The chapter aims to make biometric data an accessible option in the toolbox of user researchers.

Pejman Mirza-Babaei talks about GUR reports in Chapter 18. It details the requirements of a GUR report, such as communicating the results accurately and motivating the team to make changes that increase quality. Its main message is that reporting findings is just as important as the finding themselves; the chapter describes pitfalls that arise when the reporting is inadequate.

Chapter 19 discusses game analytics. Anders Drachen and Shawn Connor describe what they are and how they can counteract weaknesses in traditional approaches. Game analytics can be deployed in any study size and are compatible with the various methodologies of GUR, making for a powerful method.

Part 3: Case Studies and Focus Topics (Chapters 20–30). This part presents a range of chapters that cover topics which are specific to particular types of games or situations or present case studies of GUR work in specific games, and show well the breadth and depth of GUR work. From leveraging analytics in indie studios, to dealing with the problem of bias imposed by lab settings, evaluating user experience in *Dragon Age™*, running user testing on a budget, involving players with special needs, and using GUR in VR and beyond, these chapters characterize many of the current front lines of user research.

Chapter 20 is aimed at small-to-medium-sized studios wanting to introduce analytics into their development process. Lysiane Charest focuses on concepts and techniques that are most useful for smaller studios and that require minimal skills. While money is always an issue, plenty of free analytics tools exist, whether they are third-party tools or simple in-house solutions. The chapter details how the most important factor is the availability of human resources.

In Chapter 21, Pejman Mirza-Babaei and Thomas Galati discuss user testing for indie studios. They describe how user testing often requires significant resources and expertise, but can be conducted in an affordable manner. The chapter explores the contributions of analytic techniques for existing GUR methods.

Guillaume Louvel talks about ecological validity in Chapter 22. He recognizes the biases inherent in user testing in lab conditions and prescribes remedies

to increase validity. The duality between experimental conditions and ecological validity is discussed, with validity being most useful as it makes results meaningful.

Chapter 23 is a case study. James Berg describes the use of GUR in the development of *Dragon Age: Inquisition*. Challenges arising from the size of the game world, combat mechanics, and player classes and play styles are discussed. The chapter analyses the contributions of GUR to the game design.

In Chapter 24, Julien Huguenin discusses GUR on a budget. It provides a road map, from testing your game on the side with almost no resources to creating a dedicated lab space. Lessons are discussed.

Johan Dorell and Björn Berg Marklund continue the discussion about GUR on a budget in Chapter 25. Even when resources and prior GUR experience are low, small starts can be expanded to greatly impact the developer's working processes. Guidelines are provided for beginning to use GUR processes, including a step-by-step guide.

In Chapter 26, Steven Schirra and Brooke White present GUR for mobile games. They consider the context of gameplay for these types of games and prescribe methods which fit its mobile and touchscreen nature accordingly. This chapter considers the constraints of lab-based research in this context and explores field study methods such as diary studies.

In Chapter 27, Kathrin Gerling, Conor Linehan, and Regan Mandryk deal with the challenges involved in testing with special needs audiences. They describe three cases, focusing on young children, people with disabilities, and older adults. For each, playtesting challenges and user involvement in early design stages is discussed. Strategies to establish respectful and empowering methodologies with diverse audiences are explored.

Nick Yee and Nicolas Ducheneaut talk about the differences among gamers in Chapter 28. The model of gaming motivations is an empirically validated and accepted bridge between player preferences and in-game behaviours. Most importantly, engagement and retention outcomes can be calculated on the basis of the model.

In Chapter 29, Johanna Pirker discusses social network analysis. In the context of player and in-game data, network analysis can help researchers understand player behaviour in a social context. Key elements of network analysis and their benefits to user research are discussed.

Ben Lewis-Evans outlines GUR for virtual reality (VR) in Chapter 30. Recent interest in VR has led to studies and development around the game design issues unique to VR. Simulation sickness, for example, is a significant issue to

be addressed. This chapter discusses the challenges for GUR posed by VR and makes practical considerations to minimize risks.

Finally, in Chapter 31, Anders Drachen, Pejman Mirza-Babaei, and Lennart Nacke discuss the rapid changes GUR has gone through as a domain of inquiry and as a community. Here, key areas of current work are identified and their potential and future are discussed. Areas of discussion include behavioural and physiological tracking, VR, and efforts to broaden target audiences. Challenges and opportunities for industry and academia are discussed.

1.4 About the editors

Anders Drachen, PhD, is a Professor at the DC Labs, University of York (UK) and a veteran data scientist. He is also affiliated with Aalborg University (Denmark) as an Associate Professor, as well as a game analytics consultant at The Pagonis Network. His work in the game industry as well as in data and game science is focused on game analytics, business intelligence for games, e-sports analytics, monetization, data mining, game user experience, industry economics, business development, and Games User Research. His research and professional work is carried out in collaboration with companies spanning the industry. Along the way he has supported the development of over a dozen games. He is one of the most published scientists worldwide on game analytics, virtual economics, user research, game data mining, and user profiling, having authored more than 100 research publications on these topics. He is also an editor of *Game Analytics: Maximizing the Value of Player Data*, a compendium of insights from more than 50 top experts in industry and research. He has served on the steering committee of the International Game Developers Association Special Interest Group on Games User Research. He is a former lead analyst for SaaS analytics solutions provider Game Analytics. He writes about analytics on andersdrachen.com and digitalcreativity.ac.uk. His writings can also be found in the pages of trade publications such as gamesindustry.biz and gamasutra.com. His research has been covered by international media, including *Wired*, *Kotaku*, and *Forbes*. His research has won multiple awards. He can be found on Twitter @andersdrachen. He has been attacked by sharks three times and written a cooking book on ice cream.

Pejman Mirza-Babaei, PhD, is an Assistant Professor for Human-Computer Interaction and Games User Research at the University of Ontario Institute of Technology. He is also the User Research Director at Execution Labs, Montreal. He is a leading authority on GUR for independent game studios and champions

the adoption of user research in game development. He has been involved with the GUR community since 2009, and has published more than 50 research articles and numerous other writings on GUR (most of them are available on his website: www.pejman.ca). He has co-organized workshops and courses in international conferences on user research. He has contributed to more than 20 published games, including award-winning titles such as *PewDiePie: Legend of the Brofist*, *Crysis 2*, and *Weirdwood Manor*. He loves rabbits (his rabbit Maple once got invited to serve as a conference program committee member) and has lovingly adopted several dogs.

Lennart Nacke, PhD, is the director of the HCI Games Group and an Associate Professor for human-computer interaction and game design at the University of Waterloo. He is a world-leading authority on the cognitive and emotional aspects of player experience in video games, with a special focus on physiological metrics and gameful design. He has authored more than 100 research publications on these topics, which have been cited more than 8,000 times. He can be found on Twitter (@acagamic) and is also working as a gamification and user experience consultant. He chaired the Computer-Human Interaction (CHI) PLAY 2014 and Gamification 2013 conferences, and is currently the chair of the CHI PLAY steering committee. He is an editor of multiple research journals and a subcommittee co-chair of CHI 2017 and CHI 2018. He has served on the steering committee of the International Game Developers Association Special Interest Group on Games User Research and loves the GUR community. His research group writes articles at www.hcigames.com, teaches a heuristics course at gamefuldesign.hcigames.com, publishes videos at youtube.com/hcigames, and they also tweet from @hcigamesgroup. He loves karaoke, chocolate, and beaches, not necessarily in combination.

1.5 Acknowledgements: advisory board and students

It took more than two years and more than 80 amazing people to make this book. GUR is not a topic to be taken lightly and the sheer variety of methods being used and the numerous ways in which we build and design games make it incredibly challenging to describe what GUR is within the pages of just one volume. Along the way, the GUR book was helped along by our stellar authors who contributed the chapters you find here, but also by our advisory board and supporting students.

The book would not have happened without our advisory board, a band of luminaries who have championed GUR for over a decade, some of them long-time friends, advisers, and mentors of the editors. We would like to thank, for their incredible support in helping us write a book with strong focus on GUR, Michael Medlock, David Tisserand, Ben Medler, Graham McAllister, Gareth R. White, Ian Livingston, Regan Mandryk, Dennis Wixon, Mirweis Sangin, Randy Pagulayan, Regina Bernhaupt, Christian Bauckhage, and Veronica Zammitto. Without this incredible team, this book would have not been possible. Thank you.

The book has also been helped immensely by an amazing group of GUR students from the Saskatchewan-Waterloo Games User Research Network and the University of Ontario Institute of Technology's UXR Lab (www.UXRLAB.ca), who supported the editors with the myriad practical details that go into collecting and editing material from dozens of people working across different fields, production sizes, and contexts: Colin Whaley, Giovanni Ribeiro, Karina Arrambide, Marim Ganaba, Melissa Stocco, Rylan Koroluk, Brianne Stephenson, Samantha Stahlke, Nelly Hamid, Alberto Mora, Gustavo Tondello, and Katja Rogers. Thank you.

Finally, we would like to acknowledge and thank the wider GUR community as represented by the International Game Developers Association Special Interest Group on GUR. This great community of over 1000 people across industry and academia forms a network for anyone interested in GUR, and has developed several initiatives towards supporting the field, including the yearly GUR summits, online knowledge repositories, and a highly active online form. For more information, please visit www.gamesuserresearchsig.org.

PART I

Games User Research in Production

CHAPTER 2

Games User Research as part of the development process in the game industry

Challenges and best practices

VERONICA ZAMMITTO, *Electronic Arts*

Highlights

Practising Games User Research (GUR) within a video game company possesses unique challenges, ranging from tight turnaround of findings to collaborating with the development team and incorporating the needs of the rest of company. This chapter describes processes and best practices for applying GUR in the industry while identifying and avoiding potential pitfalls.

2.1 Introduction

Games User Research (GUR) has become an established component in the making of video games. Major game developers and publishers such as Electronic Arts, Microsoft, Sony, Ubisoft, and Warner Brothers conduct GUR in-house. Smaller companies like Paradox and independent developer incubators such as Execution Labs also have dedicated staff for conducting research on

players' experience. Although the actual organizational structure and specific needs vary across companies, the core responsibilities and execution is consistent (see also chapter 3).

This chapter provides the state of the art of GUR in the game industry, which has been evolving and optimizing itself over the last several years. This is relevant information for practitioners and academics alike serving as a guideline for:

- foundations of a business case for those researchers about to champion introducing GUR into a game company
- insights on organizational implications and how to structure a GUR team
- inspiration and comparison to optimize the practice of researchers already in the industry

2.2 Games User Research in the industry

Research efforts on understanding player experiences and game design implications have been present for most of the industry history; however, it has become properly formalized as a discipline—GUR—only within the last decade. The first associations, books, and venues solely dedicated to the field serve as landmarks. These include the first Digital Games Research Association's (DiGRA) conference in 2003, foundational books in 2008 and 2010 (Bernhaupt, 2010; Isbister and Schaffer, 2008), the first GUR Summit in 2010, and CHI PLAY in 2014.

There has been an increasing number of papers on user experience (UX) and GUR in key venues such as those under the Association for Computing Machinery (ACM) digital library and in particular the Special Interest Group on Computer-Human Interaction (SIG CHI). Papers across the whole ACM library that included 'user experience' as keywords started in the 1990s; from 1991 to 2000 there were a total of 167 publications, the following decade had 5,665 papers. All in all, the importance of UX across technological products has skyrocketed; the niche GUR community has provided up to 10% of the HCI contributions (Carter et al., 2014; Law, 2011).

The first integration of GUR within game development happened at Microsoft in 1997 when the first UX researcher for the gaming division joined the company as a contractor. Within seven years the team grew significantly, encompassing a total 35 people (Fulton, 2010). Other companies also started investing in GUR departments, and nowadays all major game companies have dedicated GUR

Table 2.1 *Subset of video game companies and their number of employees dedicated to GUR activities, including UX researchers, support staff, and managers, as of May 2016. (*) includes market research, analytics, and data science staff*

Company	Number of GUR staff
Electronic Arts	110 (*)
Microsoft	60
Paradox	5
Riot	70 (*)
Sony	23
Ubisoft	105 (*)
Volition	3

staff (see Table 2.1). Regardless of the specifics of investment on the number of employees and resources, this trend has impacted not only large companies but also small companies, as well as consulting firms solely dedicated to this field. Moreover, as the understanding of players matures within game companies, relevant related disciplines are consolidated within larger departments; as it is in the case of Electronic Arts, Riot, and Ubisoft where Games User Research, market research, analytics, and data science are part of an internal larger organization.

2.2.1 Who does GUR in a game company?

GUR practitioners come from a variety of backgrounds, although most commonly they hold a graduate degree (master's or doctorate) in one of the disciplines that the field draws from, such as psychology, computer science, and HCI. Such academic training provides a key understanding of research fundamentals, skills for defining hypotheses and variables, designing a study, and collecting and synthesizing data, all of which are at the core of the GUR practice.

Below are the two prototypical sets of responsibilities and associated roles that are carried out within a GUR group at a game company. It should also be noted that there can be multiple levels of seniority within them:

- **Research:** This covers all the aspects of performing a study, from requirements gathering, research design, creating test scripts, and conducting tests, to analysing data, producing reports, and delivering findings.
 - **Moderator and Analyst:** Involved in conducting tests, data collection, as well as helping with analysis.

- Researcher: Responsible for the study design, ensuring that it's carried out properly, analysis, and reporting.
- Support: This encompasses all activities related to handling of resources employed for tests.
 - Recruiter: Handles the database of participants, screening, and inviting suitable candidates for each test.
 - Lab technician: Manages the lab equipment, ensuring all software and hardware functions properly for the tests.

Depending on the size of the company, all of the above roles can be carried out by different people or all of them by a single person. In many cases, researchers, beyond analysis and reporting, also have to do their own recruiting, setting up the lab, moderating, and taking notes. This happens more often in smaller companies and in early stages of GUR groups. When resources are available, these tasks and responsibilities are allocated among different people.

There are two clear advantages in having multiple people distributing the tasks: firstly, the development of expertise, which leads to a faster optimization of the process; secondly, and more importantly in the industry sphere, the activities can be carried out in parallel, which translates into achieving the same output in a shorter time. If participants can be recruited both while the lab is being set up and while the script of the session is developed, it can be best aligned with the timeline of production. In this way it would be possible to have a faster turnaround of results from the test, minimizing having development advancing without critical information.

In a nutshell, when GUR departments start, it is common that all activities are carried out by a single individual. However, as the team grows and the demand increases, it is almost essential to divide those roles among different people.

2.2.2 Organizational models: centralized, decentralized, and hybrid

There are three primary organizational models that a user research department within a game company can take. This is a strategic business decision that other fields in multiple industries have also faced, for instance, engineering and marketing. The two models used the most have been either centralized or decentralized within teams. However, recently there has been a new trend within game companies of employing a 'hybrid' approach (Figure 2.1).

This section covers each model, highlighting their advantages and shortcomings. Choosing a model should be based on the needs and resources of

the company. Managers must keep a long-term vision for their teams and re-assess their model as the company continues evolving. In today's industry scene, it is necessary to remain competitive and to find optimizations, whether that means having an in-house GUR department or working with a third-party agency specialized in the field.

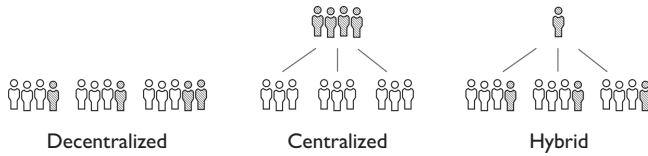


Figure 2.1 GUR organizational models

2.2.2.1 CENTRALIZED

There is one single team across the organization that carries out the user research activities. Researchers work on diverse projects, distributing their time and effort based on prioritization according to the business goals. Most commonly, researchers are all located within their own desk space, grouped together, and separated from their stakeholders.

Among the positive aspects of having central teams are the following. First, it forges a strong, tight hub of experts, which allows easier sharing of best practices. It holds them accountable for ensuring uniform quality research, and diminishes the likelihood of developers with no-research training having to oversee research activities. Second, the spectrum of projects and tasks tends to be broader and more varied, which in turn makes it more refreshing and appealing for researchers over long periods, and thus helps in retaining talent.

Moreover, the accumulation of knowledge across multiple projects and multiple individual researchers in close collaboration can more easily support the advancement of their processes, offering more opportunities for optimization of research practice. It allows them to build on learnings from one project to another, and better able to answer questions that are more complex or larger in scope across projects.

Lastly, the economic benefits of centralized teams primarily manifest through shared resources and less duplication of effort and equipment. This encourages further investment because it results in higher Return On Investment (ROI). For example, building a lab for testing, which can be used for all projects; having an internal recruiter for participants that can be a full time employee because of the combined volume of testing; or the purchasing of software to facilitate analysis across all teams.

On the other hand, an unavoidable challenge with central teams is the rationalization of resources among all projects. This leads to a permanent re-prioritization exercise of the portfolio of a company or features and modes within a game, as well as the possibility that certain teams might not receive support. This is a delicate topic that leadership in any company needs to address, because it has direct implications on the vision for the products and the morale of the teams. Another shortcoming is that the relationship with stakeholders tends to be more at arm's length. The development team might perceive the researcher as an external agent, or the researcher might feel that they are an outsider to the project. This is due to rapid development cycles where a project can radically change over the course of a week. Therefore, a researcher on a central team is often having to catch up with the team. Of course, an experienced researcher leverages as much information as possible from multiple sources (such as internal wiki documentation, mailing lists, stand-up meetings), but this does not fully overcome the absence of the researcher from daily engagement within or sole attention to a single project team.

Microsoft's GUR division (called Studios User Research) operates in a rather centralized fashion. The headquarter is in Redmond (Washington, USA) where the vast majority of the team is located, with a few researchers at three remote locations (Vancouver, Canada; London, UK; Dublin, Ireland). This team engages with multiple game developers on a variety of projects, including the Halo and Forza series. Microsoft's Studios User Research has excelled on the titles launched. The company hosts world-class lab facilities include several rooms that accommodate different types of research approaches, such as multi-station playtesting rooms, to usability one-on-one rooms, and living-room-like set-ups (Microsoft Studios User Research, 2015a). These resources can meet the needs of the multiple researchers working with diverse projects. As a central team, they leverage on the constructed knowledge from the research done for different games, regularly synthesizing and publishing best practices (Microsoft Studios User Research, 2015b).

2.2.2.2 DECENTRALIZED

On the other end of the spectrum is the decentralized approach, where there are multiple independent GUR departments or individuals across the company. There is no organizational mandate to have them all aligned within a reporting structure, and they have the freedom to conduct processes differently as they see fit. These researchers are generally part of a development team to which they dedicate all their efforts.

The most advantageous aspect of decentralization is the high sensitivity to the needs of the specific group the researcher works with, which also leads to having a strong, positive impact on the perception of research as part of the development team. The researcher generally sits within the development area; this enables more channels of communication, particularly informal ones, and there is a constant dialogue. The researcher's level of knowledge about the game is deep and the design intentions are highly contextualized. Prioritization is not an issue in this model because the researcher is dedicated to the team they belong to, which in turn offers the utmost flexibility.

The shortcomings of the decentralized model are related to scalability, risk of comparable results, pacing for improving processes, and cost of resources. Having a researcher exclusively dedicated to each team means that a greater overall headcount is needed, which is a finite resource within any company. It also requires maintaining a full-time workload, and while there can always be research needs to satisfy (e.g., competitor evaluation, wireframe testing, playtesting, and post-launch analysis), it all depends on the production timeline and where the most impactful resource allocation is. When researchers practise their craft independently of one another, it is unavoidable that there will be differences in process and execution. Dissimilarities in practices can occur in the way that tests are conducted and in which measurement scales are used. For instance, in one playtest players fill out a questionnaire every 15 minutes, whereas in another they have an exit interview at the end after a full hour, and even though both of them answer questions on a 5-point scale, the anchors are completely different. The results of those two tests cannot be compared, missing an opportunity to benchmark against each other.

Because the single researcher does not have access to other projects, the opportunities for mentorship and learning from fellow researchers are not as present as in central teams. Therefore, the opportunities for iteration and refinement of processes are also less frequent, which can lead to a slower pace of advancement of research practice. Researchers in decentralized models require more effort to stay up-to-date in best industry practices via external resources such as engaging with community peers and reviewing presentations at key events like the GUR Summit (IGDA SIG Games User Research, 2015).

Lastly, acquiring resources in decentralized environments can also be more difficult because the costs cannot be spread out among multiple teams. This ranges from acquiring dedicated space and equipment for lab usage, to the purchase of software that can help to collect and analyse data. Compounding this issue would be duplicating equipment, resources, and efforts across the larger organization.

An excellent example of a decentralized GUR practice in the game industry is Ubisoft, because it has grown organically from within departments at multiple studios and they have actively worked to overcome all the shortcomings of this type of organizational model. Ubisoft GUR is distributed across 13 departments, which are located at different studios around the globe, including Montreal and Toronto (Canada), Montpellier (France), Malmö (Sweden), and also at the editorial division in Paris (France). Each department is autonomous, yet they have collaborated with each other over the years to achieve a consistency in their test instruments to make results comparable, sharing guidelines, tools, and labs space as needed (Debray and Wyler, 2015).

2.2.2.3 HYBRID

The latest trend in organizational models is a hybrid approach, where there is a single GUR department across the organization with a core at a central level, yet also having researchers embedded within the development teams. This way it tries to combine the best of both worlds. The focus is on maintaining a defined mandate on procedures and resources across the company while at the same time dedicating researchers to specific projects.

Positive aspects of this model are the unified best practices, the shared resources and technology, and deep integration with the development team. Similarly, as in central organizations, there is a shared knowledge on protocols and procedures. There is room for undertaking company-wide research and pushing the boundaries for new methodologies (see chapter 7 for an overview of GUR methods). Researchers do not need to waste time figuring out, for instance, which methodology to employ in a certain situation or what type of questions to ask to measure player experience. Additionally, everyone has access to technologies and resources such as lab space, survey software, and analytical tools. The distinction of this model is that on top of all these advantages, it also has the positive aspects of the decentralized model, where there are dedicated researchers as part of the development team. This has great implications for establishing long-term relationships with the team, more channels of communication, and increased sense of belonging.

The risks within this model are maintaining the relationship between central and embedded researchers, and sustaining tailored strategies while still keeping alignment with general processes. As embedded researchers spend all their time with the design team, circling back with the central team is less frequent. Scheduling activities for all researchers—such as mandatory check-ins, lunch

and learn, peer review of documentation, and socially oriented team-building events—can help to minimize such potential disconnection.

Embedded researchers might also tend to feel a sense of urgency to over-tailor strategies for their development teams. This may generate a dissonance between established processes and alternate proposals. Such situations can lead to two non-ideal scenarios: (1) if the new proposal does not align with the central approach, the results can be isolated and non-comparable; (2) there might be a lost opportunity for a new idea that could have evolved into an established process.

Riot Games is a company that has been implementing a hybrid approach (Hsiung, 2016). The company has both central and embedded researchers. The central ones take care of initiatives such as regional variation studies, competitive analysis, and R&D. The embedded ones work directly with the development teams, ensuring they communicate across all the levels of the team, from those working on specific features (like a map) to whole sections of the game (like gameplay).

Electronic Arts is another company using a hybrid approach. The central component is strong even though the team is geographically distributed across eight locations, with researchers working on a myriad of projects ranging from Battlefield to NBA mobile. Best practices and guidelines are shared from a central level. Researchers who are embedded sit and work with specific game teams developing specific knowledge and relationships.

In conclusion, GUR teams at game companies can thrive in different organizational structures, whether centralized, decentralized, or hybrid. Each approach has its own strengths and risks, with an emphasis on either strong processes or a deep relationship with the development team—or trying to maintain a balance between the two. When adopting one or the other structure, an organization must be sensitive to the company-wide culture, the stage of growth of UX, and the resources available.

2.3 GUR planning and deliverables

Regardless of the actual organizational structure and size of a GUR team, researchers are responsible for planning and executing research, analysing data, and delivering findings. This section covers the different instances of designing research and how to convey results to the development team.

Across the game industry there are prototypical phases of development. They represent how much the content of the game is going to evolve at each stage (Novak, 2011). There are core parameters that are followed by all game companies; moreover, each organization elaborates detailed versions of these phases, creating clear guidelines for defining milestones and precise internal lingo. For instance, at Electronic Arts this plan is called the game development framework. Such documentation is part of the company culture and ensures everyone has the same understanding. GUR practice aligns with the development process, setting the foundation for long-term planning, then continuously executing research and bringing back findings to improve the player experience quality.

2.3.1 Long-term planning

It is possible to say that any commercial game has been developed following these phases. The exact length of the whole cycle varies depending on the scope of the game. Overall, it typically ranges from 12 months to 3 years. GUR is part of the full development process, and there are prototypical research questions at each of those stages. Researchers must work with the development team to further tailor the questions in terms of specific game characteristics and design intentions, as well as recommending the most appropriate techniques to carry out research. Over the last few years, the importance of a mixed-methods approach has been emphasized in order to properly understand the complexity involved in player experience (Ambinder, 2011; McAllister and White, 2010; Mirza-Babaei et al., 2013; Zammito, 2011) (see also chapter 5).

Table 2.2 delineates the prototypical stages of game development along with the key research efforts.

2.3.2 Short-term planning

Throughout the development cycle, there will be a number of research tests; the exact number will be dependent on the organizational model of the company, the scope of the game, the resources available, and the overall time frame of development.

Regardless of the specific research question and methodology employed, it is a good practice to conduct at least one study every two weeks. This is applicable for an average usability session with eight participants in a one-on-one, think-aloud set-up, or for a playtest with twenty-four players and data collected through surveys. The main reason this length of time for each session is preferred

Table 2.2 Stages of game development, its associated content, and GUR activity

Stage		Content Scope	Key GUR undertakings
Pre-production	Concept	It is centred on the ideation of the game	Competitor evaluation
	Documentation	The core plan for features and game scope	Define overall UX vision and ideal player experience from game features
	Prototype	Initial implementations, like whitebox and user flows	Usability testing on basic interaction and core loop
Production	Production	This stage encompasses the main cycle of development, where content is added and the level of polish increases	Evaluation of usability, behavioural, and attitudinal aspects of the player experience at each milestone
	Alpha	Milestone reached when core gameplay features are implemented	Usability testing on features and player experience evaluation
	Beta	Milestone reached when a complete version of the game with full content is implemented	Usability on onboarding, full-playthrough testing
	Gold	Milestone reached when a version of the game is at quality and is ready to be launched for public release	Playtesting on final balancing and tuning
Post-production / Live Service		It covers all actions after the game has been released, including patches, expansions, and live content	Ongoing usability, balancing, and player experience evaluation as more content is released

is that the development team can have findings within days after the testing has occurred, which leads to the content evaluated staying relevant. Development continues to advance while research is being done. Therefore, when more than five days have passed, there is a very high risk that the content has evolved to a point where it is no longer comparable to its previous version due to the nimble adjustments to design. Thus, findings become obsolete; this has negative implications: not only does the team not have the needed information to iterate but the investment in resources for research has been wasted. The researchers'

morale can also be affected, given that their effort is now inconsequential to the rest of the development team.

Researchers must learn to manage the scope of a session to fit within their development team's cycles and output findings with relevant content. It is a common mistake among junior researchers to set broad research questions or collect redundant data that slow them down in their analysis.

A default test can be divided into four steps: preparation, execution, analysis, and reporting.

1. Preparation: requirements gathering, defining the research question, recruiting participants, creating the script for the test. All tasks can be done within four days.
2. Execution: the players take part in the study; the session is conducted; data are collected. It is generally done within a day or two.
3. Analysis: the data are processed and conclusions are drawn. It is done within one to four days after the test.
4. Reporting: findings are conveyed into a shareable deliverable. The exact format and look varies from company to company (addressed in Section 2.3.3). Nevertheless, there is consensus that it must happen within one to five days after the test.

Involving the design team at each step is critical for the success of research. Stakeholders must be part of the discussion about a test's requirements and objectives. It is also very powerful to have the design team to watch the session as it happens; this can be done from an observation room or via livestreaming. Communicating findings to the stakeholders promptly is incredibly helpful in achieving a great product.

2.3.3 GUR deliverables

The purpose of a GUR department is to contribute towards the understanding of the player experience in order to be able to improve it. Reporting findings is the place where research and design meet, successes and failures of the design are highlighted, and recommendations for action are made. GUR deliverables can take multiple shapes. While there is common ground on foundations, each company makes variations and generates its own guidelines. Improving formats and efficiencies for reporting is an ongoing topic of interest among practitioners (Rebetez, 2012; Zammito et al., 2014).

There are four primary forms a GUR deliverable can take:

1. **Written report:** This is by far the most common way that findings are conveyed to stakeholders, generally as a slide-deck or a document. A great written report will stand out by being concise yet fully informative. Data should be visualized for communicating insights at a glance. At Electronic Arts, there are two main instances when a written report is sent out: one is a 'top liner', which is delivered within one day after the test has been conducted; it contains a high-level analysis such as tracked key performance indicators (KPIs) and main qualitative trends or observations. This provides the game team with quick indications on where the main issues or gains are so they can continue allocating resources and changes accordingly. The second instance is the final report which gets delivered 3–5 days after the test, and contains a full analysis.
2. **Debrief:** This is a verbal delivery, generally in the form of a presentation and discussion by the time a full written report is ready. Debriefing with the development team has multiple benefits, including strengthening the relationship with stakeholders, helping them to unpack all findings, following up on specific leads, and diving into details that help them to understand better players' reactions.
3. **Workshop:** This approach was developed by Sony CEE (Rebetez, 2012). It was driven by the need to deliver results promptly while maintaining quality and confidence in the findings. It consists of conducting an analysis and meeting with the development team within two days after the test to review the issues and discuss potential solutions. After the meeting, time is allocated for further analysis of the agreed top issues and for writing a full report.
4. **Ticketing issues:** This format involves all identified UX findings being entered into an issue-tracking software such as JIRA or Hansoft, which are typical tools developers already use to manage their work. This is a recent trend that complements a full report, and has started being applied at Electronic Arts. Although the exact context of session details for each entered issue is less visible, there is a tremendous gain in providing access to findings to the whole development team. Moreover, it supports accountability by researchers and developers to raise issues, follow them up, assign owners to act on them, and easily track the impact of GUR on the development process.

2.4 Takeaways

Creating, growing, and leading a successful GUR department that is part of game development requires an organizational model that connects with the company culture and evolution. It also needs sound research processes that align with the pacing and production of game teams. Finally, it must produce outputs that are clear, actionable, and delivered in a timely manner. There are three keys to achieve these characteristics: scope, communication, and flexibility.

Scope determines how much work is needed within a company and for any given project, which in turn has a direct impact on the organizational model: for example, does every team need a fully dedicated researcher? Are there overarching research questions that should stay central? Scope is also essential for each test session, which is determined by the agreed research question; it must be big enough to shed light on the design and help to make a better experience, but small enough to be tackled within days in order to obtain findings in a timely fashion to stay relevant. Delivered results also need to be scoped in order to make them easy to share, informing without overwhelming.

Communication in our practice is key. It is more than a transaction of information, it involves influence. On top of informing designers, researchers should have the right conversations that guide transformation for a better player experience. The organizational model of a GUR department will determine which channels are strongest. Researchers must engage in dialogue with the development team in a timely fashion, regardless of whether the organizational structure is centralized, decentralized, or hybrid. The trick is to balance the ongoing communication in person, via email, and through documentation. Leveraging existing channels where the information already flows—such as mailing lists, wikis, and stand-up meetings—will contribute to efficiency and good relationships. Communicating feedback on UX matters is the ultimate deliverable of a GUR team. Conveying those effectively will drive change for improving players' experience.

Flexibility must be exercised constantly. Keep taking the pulse of the company's evolution and adjust models as the needs of the business change. Revising priorities among and within projects is also part of the process for adaptation. Each project will present its own challenges that require updating the GUR action plan, as well as tailoring workflows and deliverables to best adjust to a specific game team. Ultimately, to achieve the best possible player experience, a successful GUR department must adapt based on the best interests of the company and of the game.

2.5 Further resources

Most GUR practitioners come from a strong academic background, therefore sharing knowledge and challenging ideas is part of our nature. A remarkable number of publications and presentations have been produced since the field was established just over a decade ago.

The number one recommendation for GUR within the industry is the series of presentations from the GUR Summit (IGDA SIG Games User Research, 2015), which is primarily driven by practitioners: <http://gamesuserresearchsig.org/summits/gur-summit-presentations/>.

For a broader spectrum across game studies and HCI, DiGRA's and ACM's digital libraries are also worthwhile sources: <http://www.digra.org/digital-library/> and <http://dl.acm.org/>. Further information can be found in the References section.

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