

## 1. Project Title

NEW REPRESENTATIONAL SPACES. INVESTIGATIONS OF INTERACTIONS BETWEEN AND INTERSECTIONS OF ART AND GENOMICS

## 2. Summary

The programme primarily aims to describe and analyse the unique role that the visual arts can have in the critical evaluation and dissemination of the results of genomics research. A second objective is to make the programme's own results available through the development of a permanent *The Arts and Genomics Center*. The programme involves an exploration of the role of the artistic imagination in the social and scientific debate on genomics. A major assumption is that visual art, through its specificity of medium and content, may contribute to public debate and the dissemination of scientific knowledge in ways that substantially differ from other forms of debate and dissemination. As such, the visual arts may contribute to a broad cultural embedding of genomics. The development of *The Arts and Genomics Center* will build on the research results and focus on the stimulation and support of interactions between art(ists) and genomics research(ers).

## 3. Principal Applicant

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## 5. Institutional Stetting

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Faculty of Humanities, Department of Art History, Chair: Modern & Contemporary Art History, Universiteit van Amsterdam; Graduate School Huizinga Institute for History and Culture.

## 6. Period of Funding

Four years; 1 January 2004

## 7. Composition of Research Team

a. Prof. dr. R. Zwijnenberg, principal applicant, project leader, supervisor PhD-project 2 and synthesizing project	Chair Art History in the relation to the development of science and technology	Faculty of Arts and Culture, Universiteit Maastricht
b. Mevr. dr. M. van Rijsingen, co-applicant, co-supervisor PhD-project 1	Modern & Contemporary Art History	Faculty of Humanities, Universiteit van Amsterdam
c. Mevr. drs. J.B. Boulboulé, PhD project 1	Modern & Contemporary Art History	Faculty of Humanities, Universiteit van Amsterdam
c. Mevr. drs. D.M.A. Hofmans, PhD project 2	Art history in the relation to the development of science and technology	Faculty of Arts and Culture, Universiteit Maastricht
c. Mevr. dr. M. van Rijsingen, synthesizing project	Modern & Contemporary Art History	Faculty of Humanities, Universiteit van Amsterdam
c. scientific manager <i>The Arts and</i>		<i>The Arts and Genomics Center,</i>

<i>Genomics Center</i> ; not yet known		Swammerdam Institute, UvA
Prof. dr. D. Gamboni, supervisor PhD-project 1	Chair Modern & Contemporary Art History	Faculty of Humanities, Universiteit van Amsterdam

**Members expert team:**

Taco Stolk	Conceptual and media artist; coordinator of the (virtual!) Genetic Design College of the Royal Academy of the Arts, The Hague	- Head ExtraFaculty, Royal Academy of the Arts, The Hague - Lecturer MetaMedia, department Image and Sound, The Royal Conservatoire / Royal Academy of the Arts, The Hague - Lecturer MetaMedia, Media technology, Leiden Institute for Advanced Computer Science, Faculty of mathematics and Physics, Universiteit Leiden
Stijn Huijts		Director Museum Het Domein, Sittard
Jeffrey B. Wyckoff, MFA	Visual artist / Director of Intravital imaging, co-director of the Analytical Imaging Facility	Albert Einstein College of Medicine, Bronx NY
Prof. dr. Hans-Jörg Rheinberger	Molecular biology / philosophy of science	Director Max-Planck-Institut für Wissenschaftsgeschichte, Berlin
Prof. dr. Stephen Wilson	Conceptual/Information Arts (CIA)	Art Department, San Francisco State University
Prof. dr. J. van Dijck	Media studies	Faculty of Humanities, Universiteit van Amsterdam
Prof. dr. J. Geraedts	Department of clinical genetics	Universiteit Maastricht
Prof. dr. G. de Wert	Department of health ethics	Universiteit Maastricht
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Prof. dr. D.L. Willems	Division Public Health	AMC, Universiteit van Amsterdam
Denna Jones	Curator TwoTen Gallery / Member advisory board Sciart programme	The Wellcome Trust, London

## **8. Description of the Proposed Research**

### Aim of the programme

*The programme primarily aims to describe and analyse the unique role that the visual arts can have in the critical evaluation and dissemination of the results of genomics research. A second objective is to make the programme's own results available through the development of a permanent The Arts and Genomics Center.*

The programme involves an exploration of the role of the artistic imagination in the social and scientific debate on genomics. A major assumption is that visual art, through its specificity of medium and content, may contribute to public debate and the dissemination of scientific knowledge in ways that substantially differ from other forms of debate and dissemination. As such, the visual arts may contribute to a broad cultural embedding of genomics. The development of *The Arts and Genomics Center* will build on the research results and focus on the stimulation and support of interactions between art(ists) and genomics research(ers).

### Introduction and background

Since the late 1980s, when England and America began to allocate big funding for research of the Human Genome by instigating the Human Genome Project, many artists have become fascinated by this project. Artists like Suzanne Anker, Eduardo Kac and Larry Miller were among the frontrunners, but artist-groups, such as the *Critical Art Ensemble*, and double-talents (artists with training in science), such as Jeff Wyckoff, were also prolific early on. Moreover, many collaboration projects between artists, bio-scientists and biotechnologists were launched, initiated mostly by research institutes that explore the boundaries between art and science. One of the major institutes that seek to generate discussion on the social, cultural and historical dimensions of medical and biotechnological research is *The Wellcome Trust* (UK), which actively supports the interaction between artists and the public. Other initiatives on both sides of the Atlantic have resulted in exhibitions, publications, conferences and internet-sites on art and genomics, thus contributing to the dissemination of knowledge and reflection in the public domain.

Artists with an interest in genomics have meanwhile tackled a variety of issues, including heredity, identity, aging, sickness and health, overpopulation, warfare, the biotech market, genetic licensing, designer babies and cloning. But rather than simply calling critical attention to these issues, many of these artists have a much more sustained interest in them. Many artists have in fact become researchers in their own right. They question controversial issues in scientific research and draw critical attention to the experimental research methods that are used in molecular biology and biotechnology, specifically on the level of visual meaning production. Generally, artists have developed a strong awareness of the function and effects of visualisation technologies and representational strategies in the production of knowledge, and this is increasingly true of scientists as well. Both rely on collecting data, mapping data-fields, translation, combination, and interpretation (Wilson 2003). In the last two decades, with the advent of information technology, artists and scientists have both concentrated on so-called gliding and flickering signifiers of digitalised media and computer-software. And recently there has also been a growing understanding of the significance of the material basis of genomics knowledge. For instance, artists began to work with living materials, something that has caused fierce public responses. All these developments have significant effects on the way scientific knowledge is produced and disseminated. Increasingly, artists and scientists seem to acknowledge that there is a shared field of research and representation.

### Main concern and theoretical framework

The proposed programme starts from a general thesis and two interrelated assumptions that specify the theoretical framework. The *general thesis* concerns *the possibility of the intersection of art and genomics*. The intersection of (visual) art and science has a long history. As historical and theoretical sources reveal, by the nineteenth century, art and science were increasingly seen as separate domains (Misa/Brey/Feenberg 2003). The explosion of knowledge and the onset of a radical modernization process caused art theorists to articulate more autonomous artistic goals. Subsequently, throughout the twentieth century there were recurring efforts to close the gap again, especially by the avant-garde movements of the 1920s and 1930s that were highly interested in technology and its rapid developments. Since the 1950s and 1960s there has been a steady interest of artists in technology as a means of artistic expression. Artists and art theorists also came to acknowledge the importance of art as social agent, as a major socially integrated force (cf. Kepes 1956, Burnham 1968). Even though C.P. Snow, in his famous 1959 lecture on the ‘two cultures’, argued that “art had lost its touch with modern industrial society and was in a deep sense anti-intellectual”, his call for reintegration was in step with the times. Since the 1960s, the possibility of the intersection of art and science has become a much-theorized concern, mainly from the view that art and science belong to one system or structure.

In this respect, the following arguments will be most important in the proposed research effort: the argument that the visual and the metaphorical function in both ‘cultures’ is a fundamental means of signification and knowledge production (Stafford 1991, Fox Keller 1995, Rheinberger 1995); the more general argument that both art and science function, signify and are part of one cultural network, also referred to as “a larger complex multileveled networked, living system” (Coen 1999, Brodyk 2001), especially after the advent of information technology (Haraway 1997); and the argument that art and science both reflect ways of knowing the world and are therefore bound to interact (Kemp 1990, Anker 2001). Despite the various emphases of these arguments, they all seem firmly based on the theoretical, mainly post-structural concept of *representation as practice* (see synthesizing project). These arguments will be further investigated and perform a guiding role in the proposed programme.

In addition to its main thesis, two interrelated assumptions aim to elaborate the unique role of art in the evaluation and dissemination of genomics knowledge. The first concerns the method of art: the concept of art as a form of research; the second is about the function of art: the concept of art as mediator/disseminator of knowledge and experience.

1) *Art as form of research* requires understanding of the specific methods used by art and artists and of the function of art in society. Art as research evidently reflects a specific conceptualisation of art (e.g. Wilson 2002, Bijvoet 1997), and it assumes, at least up to a point, a particular view of the nature of the relationship between art and society (a.o. Burnham 1968, Reichle 2001). Art is seen as capable of reflecting and commenting on what is happening in the world of which it is part, based on its conceptual tools of *creativity* and *imagination*.

Although it may be argued that art has always been a form of research, given the scope of the proposed programme it is crucial to examine art’s methods and means in relation to its openness to transdisciplinarity and knowledge production. The issues of methods and means are especially important, because these have long been considered as decisive in what sets art apart from science, leading to a very different concept of knowledge. Many still believe that art is illogical, utterly personal and not seriously concerned with ‘facts’, as opposed to the assumed controlled, methodical and objective methods of hard science (Ede 2000). However, this romantic concept of art seems to be fading rapidly. The accessibility of scientific knowledge, materials and technologies adds significantly to changes in the development of art

as a form of research. A major question is how creativity and imagination operate as conceptual tools within forms of artistic research.

Over the last decades, scientific research and views on it have also changed considerably, moving from objective concepts of research to more creative or 'productive' concepts (Rheinberger 1992, Rifkin 1998, Beurton et al. 2000). Science has begun to value the imagination as conceptual tool. For this reason, art's expertise on the visual, visualising technologies and visual signification can be of huge importance for scientific research, as history has taught us already (Kemp 1990). Obviously, this adds to the need for a close scrutiny of art and science as intersecting domains.

2) *Art as mediator/disseminator* requires understanding on two levels: how does art communicate and what is communicated. A focus on art as mediator/disseminator especially draws on the idea that art embodies specific expertise in signification in the field of the visual (Kepes 1956, Stafford 1991, Arnold 2000). Art acts as an interface between knowledge production and reception (Kemp 1990, Van Dijck 1998, Franklin 1993/2003).

Communication is seen as a function of art; art communicates through the *imagination*. Thus, the imagination not only functions as a conceptual tool in artistic research, but also as a mediating tool in communication with the public (Van Dijck 1998, Franklin 1993/2003, Haraway 1997). As such the imagination reveals specific qualities: it provokes interpretation and transformation. Through the mediating tool of the imagination, art can act as interpretive reflection and commentary on developments in science. Art can be a critical tool to keep information flowing back and forth between science and the public (Berry 2001, Kac 2002, Jones 2002, Hauser 2003, Altena 2003).

#### Importance and coherence of the programme

There are several levels of importance. First, the programme covers (traces, maps and interprets) a relatively new inter- or transdisciplinary field that has not yet been coherently described and analysed; the available knowledge about this domain is fragmentary at best, especially in the Netherlands. The programme will also develop new transdisciplinary conceptual and practical tools for future interactions between art and genomics. In so doing, it will rely on resources and concepts from the (natural and social) sciences and humanities. Furthermore, the programme will pursue the development of *The Arts and Genomics Center*, which will actively disseminate knowledge of genomics in the public domain. Art is capable of negotiating public fears and desires concerning scientific knowledge in an imaginative way, and therefore it may contribute to the public debate on genomics productively.

The proposed programme fits the NWO Genomics-programme in two ways: it will investigate a specific function of art, i.e. directing the public imagination towards genomics and, given the programme's focus on and expertise of processes of meaning and visual conceptualisation, it will be capable of gaining access to actual genomics research.

Because of this combined attention for science and its public negotiation through the development of *The Arts and Genomics Center*, the programme will allow genomics researchers to fashion their role in the public debate and the dissemination of scientific results more effectively, but it will also capitalize on the relevance of visualization as a specific research tool and an independent source of ideas for new research directions.

The proposed programme will consist of four projects. The first project focuses on the history of the interaction between art and genomics and the development of a vocabulary for describing and analysing the nature of their interaction. The second project involves a theoretical investigation of art's potential as a disseminator of genomics knowledge and an investigation of the strategies used in actual art/science interactions aimed at disseminating such knowledge. The third, synthesizing project draws on and guides both projects

theoretically by focusing on the level of signification and experiment in artistic and genomics research, so as to gain more insight into the conditions of representation. These three historical, conceptual and theoretical projects are designed to generate the practical and conceptual tools and resources for the fourth project: the development of *The Arts and Genomics Center*. *The Arts and Genomics Center* (in formation) will also function as a national and international meeting place for the programme researchers with artists and researchers.

**Project 1: The history of interactions between art & genomics**  
(PhD-student; 1 fte; four years)

Research aims

*In this PhD-project the historical development of the interactions between the visual arts and genomics will be described and analysed.* The *first aim* of the project is to map the as yet fragmented history of the interactions of art and genomics. In existing literature these interactions are described as part of the broader historical development of interactions between art and (micro)biology and art and technology. The *second aim* is to develop a vocabulary, instruments and objectives with which the intersection of art and genomics can be better understood. Bio-genetic art will not be viewed as an illustration of new scientific insights. The focus of the project will be on the differences and commonalities in the practice of art and genomics, specifically the role of language, visuality, imagination, experiment and technology.

Mapping this history will reveal not only when and where artists developed an interest in genomics research and genomics researchers an interest in art, but also the specific objectives, interests of and methods they used to bridge the gap between art and science.

General objectives

Interactions between art and genomics are of recent date; they started surfacing in the early 1990s after the establishment of the Human Genome Project; but there are some notable forerunners in the 1960s, when reproduction and ecological issues emerged as prominent concerns (Kranz 1974, Nelkin and Lindee 1995, Bijvoet 1997, Wilson 2002). The project will focus on scientific and artistic developments that are of crucial interest for interactions between art and genomics. For instance, from the 1950s onwards, artists acquired a more socially integrated role, while the concepts of art as communication and art as part of a larger social system of meaning gained considerable ground (Kepes 1956, Burnham 1968, Bijvoet 1997). These changes allowed for increased interactions between art and science, notably in the areas of molecular biology, physics, quantum mechanics, ecology, system-analysis and system theory, and information technology. (Bijvoet 1997, Bud 1993, Kevles and Geison 1995). A major shift took place in both art and genomics with the advent of information technology, involving new (digital) media (Fox Keller 1995, Haraway 1997, Hayles 1999). Parallel to the development of genomics as an independent transdisciplinary science, a bio-genetic art tradition evolved from art that challenged its own autonomy and that was oriented towards these various scientific disciplines. Genomics and bio-genetic art share, so to speak, the same scientific backgrounds and boundary-crossing approach.

Approach and methodological aspects

This project's focus on classifying, describing and analysing bio-genetic art has an empirical basis. It seeks to identify the role and function of the participants (artists, curators, scientists, technicians, medical engineers) in art/science interactions. The descriptions and analyses of works of art will be based on a distinction between 1. artists using new insights and new

materials; 2. artists using scientific and/or technological means and methods; and 3. interdisciplinary collaborations in experimental and creative processes.

Furthermore, the adopted approach will also rely on three *analytic points of reference* that played a major role in the histories of both art and genomics and that are therefore considered important for a better understanding of their interactions:

The *first* point of reference is ‘form’. The genesis of form (or natural structures) and the role and function of visual conventions have always been preoccupations of scientists and artists alike. It will be addressed as the problem of aesthetic form (Kepes 1956, Coen 1999). Of what use and significance is it for the interactions between art and genomics? What role does it play in the history of these interactions?

The *second* point of reference involves ‘culture’ and conceptualisation. In genetic research, various concepts (Beurton et al. 2000) and rhetorics have been used (Fox Keller 1995, Kay 2000). This has turned the Gene into a powerful metaphor in many cultural settings (e.g. Levy 1996, Nelkin/Lindee 1995). Which concepts and rhetorics appear when, and how do they function in the art/genomics interaction? How do they prepare the ground for the integration of genomics knowledge in other cultural domains, such as art?

As a *third* point of reference the increasing importance of ‘new media’ will be considered, especially from the moment of the fundamental shift that took place with the ‘age of information’ (Fox Keller 1995, Hayles 1999, Stocker/Schöpf 1999). How should we understand the interest in new (visualisation) technologies in both art and the life sciences during the second half of the twentieth century? With these new media, art and science tackle problems of ‘floating data’ and ‘flickering signifiers’: the material versus the immaterial, the visual versus the virtual, pattern versus randomness.

### Research results

The outcome of this project will consist of a comprehensive history of the interactions between and the intersections of art and genomics, as well as a vocabulary for describing and analysing the nature of these interactions and intersections. As such the project will provide theoretical and practical tools for *The Arts and Genomics Center* to stimulate and initiate new intersections between art and genomics.

## **Project 2: The dissemination of knowledge as a function of art**

(PhD-student; 1 fte; four years)

### Research aims

*This PhD-project examines the specific ways in which art assimilates and represents the results and consequences of genomics research, and how art (and artists) contribute to the dissemination of knowledge.* The aim of this project is to analyse the role or function of art as a mediator or disseminator of scientific knowledge, in order to better understand the intersections of art and genomics, and to explore which specific knowledge is considered as socially and culturally significant, and how this knowledge is communicated.

### Conceptual tools

The project will begin with a study of theories on the *function and qualities of art* in respect to science. Most relevant authors agree on the ‘creative’ or ‘imaginative’ function of art and some consider this as a common ground on which artists and (experimental) scientists can meet. ‘Imagination’ is considered as the best means to understand and communicate complicated and abstract scientific results (Van Dijck 1998, Franklin 1993/2003). However, what is exactly meant by ‘imagination’, and how is it used by artists to communicate

scientific knowledge? What role does imagination play in the interactions between scientist, artist, and (lay) public? How should we understand the term 'image' in imagination? The imaginative function of art is founded on specific qualities of art; art provokes interpretations and transformations and is metaphoric in character (Nelkin/Lindee 1995, Anker 2001, Brodyk 2001, Kac 2002). How do these qualities function in the dissemination of scientific knowledge by works of art? Should we follow Anker (1995) as she states that art functions – through its specific qualities – as a matrix, “giving its subject the diagnostic ability of a paradox –the paradox of critical fiction”? Is art a way of knowing the world through fiction? For instance, Tomasula (2002) states that bio-genetic art ‘imitates’ the immediacy of non-fiction. In regard to these specific qualities of art, some authors mention the critical dimensions of art: it makes the viewer aware of (fundamental) questions and problems of his or her time and world (Berry 2001, Kac 2002, Tomasula 2002, Hauser 2003).

### Case-studies

The theories on function and qualities of art are the theoretical context to two case-studies of intersections of art and genomics.

The *first* case study focuses on *The Wellcome Trust*, which aims “to encourage public engagement with biomedical science and its wider cultural context”. The *Trust's* views on the function of art and artists therein and the ways in which its goals are practically pursued, will be analysed. *The Wellcome Trust* developed a wide range of activities and instruments in which genetic research plays a mayor role: they encourage collaboration projects through the SciArt Award and Funds, they run a Gallery (TwoTen Gallery), engage actively in exhibition programs, sponsor publications, and recently they launched a website on genetic research. What are the views behind this policy, and how is it evaluated?

The *second* case-study concerns the *Critical Art Ensemble*, a flexible artist group that launched different projects at various sites (galleries, hospitals, public places) and on the Internet. They focus specifically on genomics and genetic research. Their conviction is that communication of the results of genetic research is poor in character. Their goal is to inform the public, and to increase public awareness of the ethical, social, economic, and juridical consequences and questions arising from genomics research: “Through the collectives activity, members hope to replace a general fear with critical tools and replace public impotence with tools for direct action” ([www.critical-art.net](http://www.critical-art.net)). The public has to be convinced of their new responsibilities and (personal) choices.

*The Wellcome Trust* and the *Critical Art Ensemble* will be considered as part of a larger field of institutions and projects with comparable objectives, such as Genomic Art (exhibition projects), ASCI (Art & Science Collaboration Inc.), or SymbioticA (artistic research laboratory in The School of Anatomy and Human Biology, University of Western Australia). The case-studies will explain the ways in which scientific knowledge is disseminated by art and how (with which means and methodological presuppositions) communication is accomplished. Important questions are: What is exactly communicated? Which artistic and scientific technologies, means and strategies are preferred in this communication? What role is played by the so-called new media, specifically the internet? Which objectives are attained? On which basis (theoretical and/or social) do scientists and artists meet, and what views on art, science and communication inform these meetings? The two case studies are inquiries into sources and reception, complemented with interviews (artists, scientists, curators, critics).

### Research results

The results of the project, i.e. a theoretical understanding of the conditions of possibility of art disseminating genomics knowledge, and a critical understanding of practical strategies used in intersections of art and genomics to disseminate knowledge, will provide *The Arts and Genomics Center* with necessary conceptual and practical tools to attain its goals.

### **Synthesizing project: Signification and experiment in Art and Genomics**

(senior researcher; 0.4 fte [0.25 fte NWO + 0.15 fte Department of Art History, UvA]; four years)

### Research aim

*This synthesizing project pursues the issue whether there is a theoretical ground for the thesis that art and genomics explore and develop common grounds of representation and signification and are therefore able to learn from each other.*

In order to understand the conditions of representation in both bio-genetic art and genomics, this project includes a study of the role and function of imagination, experiment and method, language, information-technology/informatics and cybernetics in both bio-genetic art and genomics. Furthermore, the project will describe and analyse (philosophical and cultural) themes and aspects that occur in both bio-genetic art and genomics, such as time and space, scale and perspective, material and metaphor, identity, expression and experience.

### Theoretical backgrounds and conceptual tools

This project draws on research from different disciplines, in particular the research of Hans-Jörg Rheinberger (molecular biology and history of science) on experiment and the signifying practice of the (genetic) laboratory, Katherine Hayles (chemistry and literature) on informatics, Donna Haraway (science studies) on the cultural signification of genetics and technoscience, Sarah Franklin (sociology) on the social and anthropological perspective of genetic research, and Suzanne Anker (artist), Dorothy Nelkin and Susan Lindee (artists/cultural studies) on the role of the icon and metaphor. The point of departure of this project is the “fuzzy” concept of the *gene*, that allows for an enquiry into its operational potential (Beurton et al. 2000). The definitions of what a gene is are still in flux.

The epistemic tension that emanates from this ‘vagueness’ is not necessarily a negative, but more likely a productive power in experimental scientific research.

Two further concepts will guide this enquiry: 1) the concept of *Representation as practice* and 2) the concept of *Life (itself)*.

1) Many authors use the concept of *representation as practice* to emphasise the productive and context-bound character of representation in research. One of the aims of Rheinberger (1992, 1997), for example, is to reconstruct genomics research as representational practice through an analysis of the function of specific (and changing) sign systems in the experimental practice of the laboratory. His conceptual resources are mainly taken from semiotics and epistemology. According to Rheinberger, new representational spaces are created through a collapse of nature and culture, matter and information (cf. Haraway 1997, Tomasula 2002). In this project these findings will be explored further in the specific field of visual representation, as Rheinberger already suggested in 1997.

For art(ists) the concept of *representation as practice* in the visual field is (and has always been) fundamental (a.o. Kepes 1956, Anker 2001, Nelkin/Lindee 1995, Stocker/Schöpf 1999). Moreover, artists are considered as experts on the productive qualities of the visual, or how images produce knowledge (Stafford 1991). Focussing on the concept of *representation as practice* in bio-genetic art and genomics will help to delineate common representational spaces.

2) The concept of *Life* or *Life itself*, as Franklin (1993/2003) calls it, plays a significant and signifying role – implicitly or explicitly – in most scientific research. The question ‘what life is’ has profound philosophical implications, and is taken up by both ‘hard’ and ‘soft’ sciences. Schrödinger (1967) and Canguilhem (1989) serve as a point of departure for most who elaborate on the concept of *Life*.

After the 1980s the concept of *Life (itself)* can be characterised by its double-bind: informed by both information-technology and an a priori objective that is inherently material (Franklin 1993/2003, Rheinberger 1997). The question is how exactly this double-bind changes the concept of *Life* and, in a more concrete sense, the perception of life. Genealogy can be taken as an example to elaborate on the fundamental re-conceptualisation of *Life* as a form of re-spatialisation (*ars recombinatoria*) and re-temporalisation (*ars combinatoria*). This re-conceptualisation of *Life* involves re-naturalisation, in a manner that defies separation into ‘real’ versus ‘imagined’ life (cf. Haraway 1997). Artistic practices draw on and contribute to this re-conceptualisation in specific ways that need to be considered further, especially where bio-genetic artists play with the virtual and the real.

### Practical research

In order to complement the theoretical and analytical findings of this project, an experimental laboratory will be visited: *SymbioticA*, a research laboratory “dedicated to the artistic exploration of scientific knowledge in general, and biological technologies in particular”, located at the School of Anatomy & Human Biology (University of Western Australia). This laboratory is specifically based on the idea of the productive possibility of a common representational space for art and (genetic) science.

### Coherence and practical aim

This synthesizing project both draws on and guides theoretically the PhD-projects. Moreover, it will provide *The Arts and Genomics Center* with the theoretical resources and concepts that it needs to develop into a theoretically sound and productive centre of information and exchange between art and genomics.

### ***Dissemination project: The Arts and Genomics Center*** (scientific manager; 0.5 fte; four years)

*The Arts and Genomics Center* has the objective of stimulating, initiating and supervising meetings, discussions, collaborations and exchanges between international artists, scientific researchers, and professionals from business and government organizations. As instruments for achieving its aim *The Arts and Genomics Center* will employ symposia, projects, exhibitions and publications that have the interactions between and intersections of art and genomics as leading theme. Moreover, *The Arts and Genomics Center* will stimulate and conduct artistic and (transdisciplinary) scientific research of the interactions between and intersections of art and genomics. *The Arts and Genomics Center* will thus contribute to the main objectives of the NWO-programme *The Social Component of Genomics Research*. *The Arts and Genomics Center* stimulates research into the social and cultural aspects of genomics and fundamental questions raised by genomics research. *The Arts and Genomics Center* will expand the public debate on (future) goals, means, possibilities and use of results of genomics, from the specific point of view of bio-genetic art, and develop tools for drawing in new audiences.

Visual arts are generally taking a position of criticism, doubt, resistance, and less an affirmative position towards genomics. *The Arts and Genomics Center* will entertain the full spectrum of opinion and thus fully employ the role of the arts as communicators.

The point of departure of *The Arts and Genomics Center* is the same as that of the overall research programme: art is vital for a broad cultural embedding of genomics. Because of its specific character, art can play a unique role in the critical evaluation and dissemination of knowledge and results from genomics research. Artists who focus in their work on genomics or who incorporate its scientific results (bio-genetic art), contribute to the public debate and to the dissemination of scientific knowledge in a completely different manner, as is achieved with other means of debate and dissemination. Art with its specific knowledge of visual signifiers is able not only to critically consider the experiments and results of genomics, but also to translate and represent them for a broad public, without reverting to stereotype images.

The period of development of *The Arts and Genomics Center* coincides with the duration of the research programme. The research programme will provide *The Arts and Genomics Center* with theoretical and practical tools so as to contribute to its growth. The research programme will also contribute to *The Arts and Genomics Center's* long-term agenda and policies. During the research programme *The Arts and Genomics Center* will initiate exchanges between and function as meeting place for the researchers of the programme, bio-genetic artists and genomics researchers, to ensure that researchers of the programme have access to artistic and scientific knowledge relevant to their research and that the programme as a whole can profit from necessary artistic and scientific input from outside experts.

The full proposal (May 2003) of the *Center for Society & Genomics* declares that: "The CSG creates an environment that allows experts from different fields to learn from one another, in the context of concrete research projects and other forms of collaboration". *The Arts and Genomics Center* will therefore seek close collaboration with the *Center for Society and Genomics*. With the director of the *Center*, prof. dr. H. Zwart, it is agreed that the *Center* and *The Arts and Genomics Center* will exchange information and will gear their projects to one another. Moreover, the *Center* and *The Arts and Genomics Center* will have access to each other's channels of information and networks of artists and scientists.

A Project Group will act as a sounding board and think tank to *The Arts and Genomics Center*. The Project Group will advise *The Arts and Genomics Center* on its plans for collaboration projects between scientists and artists, and it can propose projects as well. The Project Group is also an open line to genomics researchers, bio-genetic artists and organizations and institutes involved in bio-genetic art or genomics. Members of the Project Group are: prof. dr. J. van Dijck (media studies, University of Amsterdam); Stijn Huijts (director Museum Het Domein, Sittard); prof. dr. J. Geraedts (department of clinical genetics, Universiteit Maastricht); dr. F. Meulendijk (scientific journalist); Taco Stolk (bio-genetic artist); prof. dr. G. de Wert (department of health ethics, Universiteit Maastricht). For the duration of the research programme, members of the Project Group are also part of the expert team of the programme.

In addition, an International Advisory Board will be set up as soon as possible. At an early stage, *The Arts and Genomics Center* (in formation) will establish institutional contacts with institutes abroad that engage in comparable objectives, such as the *TwoTen Gallery* of the *Wellcome Trust*, the *British Sciart Award* and various foundations in the UK, France and the US. *The Arts and Genomics Center* will also launch a web site, publish information brochures, organise symposia, etc. to make its existence known to the general public.

After four years, *The Arts and Genomics Center* must be financially independent and have created its own place in the national and international field of bio-genetic art, as well as in collaborations between artists and genomics researchers, and in the public debate on

genomics. The applicants of the research programme, prof. dr. R. Zwijnenberg and dr. M. van Rijsingen are the directors of *The Arts and Genomics Center* and responsible for all activities during its foundation.

### **10. International Perspective**

The interactions between and intersections of art and genomics constitute an expanding, international research area. The proposed research will profit from many resources and research tools, exhibitions and performances in this field that are made available on the internet, in museums, in magazines, books and articles, by numerous and diverse scholars and artists, and artists-scientists collaborations, institutes and organizations, such as MIT; Ars Electronica; The Wellcome Trust; Leonardo Magazine; Critical Art Ensemble; Art & Science Collaborations, Inc., etc. However, this research projects departs from an original theoretical perspective (i.e. the elaboration of a theoretical framework to describe and analyse interactions between and intersections of art and genomics, and its theoretical and practical implications for the dissemination of scientific knowledge to a broad public) that decidedly gives this project its own unique position in the international research field of the relationship between art and genomics.

A number of (inter)national researchers and artists is committed to collaborate with the researchers of the proposed research programme: Prof. dr. Dario Gamboni, Taco Stolk, Stijn Huijts, Jeffrey Wyckoff, Prof. dr. Hans-Jörg Rheinberger, Prof. dr. Stephen Wilson, Prof. dr. J. van Dijck, Prof. dr. J. Geraedts, Prof. dr. G. de Wert, Dr. F. Meulendijk, Prof. dr. D.L. Willems, Denna Jones (see 7. members expert team). This expert team we have assembled to assist the programme has two roles. The team consists of national and international experts from the heterogeneous fields this interdisciplinary programme touches on. They will regularly serve as a sounding board. The team also consists of individuals who are well-placed to provide international entrance for research; the project will profit from the international network of these researchers and artists. In the course of the programme, the research group will organise invitational workshops and expert meetings in order to further internally coordinate the three projects, to facilitate ongoing input from this expert team, and from other relevant experts. The project will also be completed with an international workshop in which we will bring together the diverse fields relevant to the project, that is artists and scientists concerned with art and genomics, as well as the art historians and science- and technology scholars researching their interactions and intersections.

The principal applicant Prof. Zwijnenberg is also the project leader of the NWO-funded research project *The Mediated Body*, investigating various medical, scientific and artistic ways of visualizing the interior human body and its boundaries ([www.fdcw.unimaas.nl/ds](http://www.fdcw.unimaas.nl/ds)). The proposed research programme will collaborate with this project and its researchers, and will be able to profit from relevant research results and from the international network of scholars built up by *The Mediated Body*.

*The Arts and Genomics Center* will function (among other things) as international sign board of the research programme, and will facilitate by its activities the exchange between our researchers and international scientists and artists, and institutions.

### **13. Short Curriculum Vitae Principal Applicant**

Prof. dr. Robert Zwijnenberg studied civil engineering and philosophy. In 1995 he was awarded a doctorate in philosophy at the University of Amsterdam with a dissertation on Leonardo da Vinci. He worked as a lecturer in history of philosophy and aesthetics at the University of Amsterdam and the University of Groningen. In 1999 he was appointed professor of art history in relation to the development of science and technology at the department of arts and culture at Universiteit Maastricht. He has published on aesthetics and

philosophy of art, and on the relation between the arts and sciences. Currently he is preparing a volume on experimentation in art and science. He worked together with visual artists on projects regarding the relationship between art and science (Defka, Assen; Museum Catharijne Convent, Utrecht; Rinascimento Nascimento, Florence; Jan van Eyck Akademie, Maastricht). At Universiteit Maastricht, he is project leader of the interdisciplinary research program *The Mediated Body* (financed by The Netherlands Organization for Scientific Research – NWO; two PhD-students, two postdocs, one senior researcher), investigating various medical, scientific and artistic ways of visualizing the interior human body and its boundaries ([www.fdcw.unimaas.nl/DS](http://www.fdcw.unimaas.nl/DS)). He is member of the expert group of Universiteit Maastricht (a multidisciplinary team of scholars and genomics experts), represented in the *Center of Society and Genomics*.

## 14. Literature

### Selection of publications applicants

- R. Zwijnenberg. *The Manuscripts of Leonardo da Vinci - Order and Chaos in Early Modern Thought*. Cambridge University Press 1999.
- R. Zwijnenberg. *Het Gereflecteerde Lichaam*, inaugural lecture, Maastricht 2000.
- R. Zwijnenberg. Poren im Septum. In: Frank Fehrenbach (Herausgeber), *Leonardo da Vinci. Natur im Übergang*. München: Wilhelm Fink Verlag (Reihe Bild und Text) 2002, pp. 57-80.
- Florike Egmond & Robert Zwijnenberg (edited, introduction and article). *Bodily Extremities*. Aldershot: Ashgate Publishing 2003 (refereed volume).
- Claire Farago and Robert Zwijnenberg (edited, introduction and article). *Compelling Visuality. The Work of Art in and out of History*. University of Minnesota Press 2003 (refereed volume).
- M. van Rijsingen, 'Insights and dividing lines: the (bio)medical body in contemporary art', *Život umjetnosti* (special English edition), Zagreb 2003 (forthcoming).
- M. van Rijsingen, 'Data/Vlees', *Jaarboek voor Esthetica*. Budel: Damon 2003 (forthcoming).
- M. van Rijsingen, 'LabWork: artistic in-sights in medical and microbiological visualisation technologies', *Visual Knowledges* (conference proceedings), Edinburgh 2003 (forthcoming).

### International literature

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- Wilson, S., *Information Arts. Intersections of Art, Science and Technology*. Cambridge Mass. 2002.

## 15. Abstract for non-specialists

In de hedendaagse kunst is de invloed van technologie en het gebruik van allerlei moderne (vaak digitale) technieken een onontkoombaar gegeven. Een groot deel van de hedendaagse kunst, zoals allerlei multimedia kunstvormen, is zelfs ondenkbaar zonder moderne technologie. Technologie wordt echter niet alleen toegepast als (expressie)middel; kunstenaars hebben vaak ook een kritische of ideologische houding ten opzichte van technologie. Dat wil zeggen dat hedendaagse kunstenaars niet enkel steeds vaker gebruikmaken van nieuwe technologieën om hun kunstwerken vorm en inhoud te geven, zij houden zich daarenboven meer en meer bezig met de consequenties (van morele, ethische, politieke of esthetische aard) van bepaalde technologieën. Dat zien we op dit moment bijvoorbeeld met betrekking tot het genenonderzoek. De wetenschappelijke vragen die in dit onderzoek een rol spelen, zoals vragen rondom identiteit en uniekheid van het individu, menselijke vrijheid en ethiek, spelen ook een rol in veel contemporaine kunst die zich op een of andere manier bezighoudt met het genenonderzoek. Alle denkbare kwesties worden in kunstprojecten aan de orde gesteld, zoals erfelijkheid, identiteit, ouder worden, ‘designer-babies’, klonen, overbevolking, oorlogvoering en commercie (de biotechmarkt).

In dit onderzoeksprogramma zal de relatie tussen kunst en genomics (het in kaart brengen van onder meer het menselijk genoom) centraal staan. Allereerst zal de geschiedenis van de relatie tussen kunst, z.g. bio-genetische kunst, en genomics worden beschreven en geanalyseerd. Er zal worden onderzocht op welke wijze kunst gebruik maakt van de resultaten van het genomics-onderzoek en hoe specifieke technologie uit genomics in kunstwerken wordt geïncorporeerd. Voorts wordt onderzocht of er terreinen zijn waarop sprake is of kan zijn van een wederzijdse beïnvloeding van bio-genetische kunst en genomics, zoals op het terrein van de visualisering van wetenschappelijke resultaten. Dit onderzoek zal dienen om de hypothese van het onderzoeksprogramma te ondersteunen: *bio-genetische kunst speelt, door haar specifieke vorm en inhoud, een unieke rol in de disseminatie van genomics-kennis in een breed publiek, en in de sociale en culturele inbedding van genomics*. Om deze hypothese verder uit te werken, zal ook worden gekeken naar de methoden en functies van bio-genetische kunst; d.i. het hoe en waarom (op theoretisch en praktisch niveau) van een bemiddelende rol van bio-genetische kunst tussen genomics en publiek.

De resultaten van het onderzoeksprogramma zullen worden gebruikt voor de oprichting en ontwikkeling van *The Arts and Genomics Center*, dat tot doel heeft om de wisselwerking tussen en de doorsnijding van kunst en genomics te bestuderen en te stimuleren, door middel van symposia, tentoonstellingen en samenwerkingsprojecten tussen kunstenaars en genomics-onderzoekers. *The Arts and Genomics Center* zal zo vanuit de specifieke invalshoek van bio-genetische kunst bijdragen aan het publieke debat over genomics en aan de sociale en culturele inbedding van genomics.

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