

# 2K-Reality and the Compliant Sports Augmentation Framework for Grassroots Sports <sup>†</sup>

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**Abstract:** In this paper, we introduce the Compliant Sports Augmentation Framework (CSAF), which aims to promote a sociocultural approach to the design of sports technology for grassroots sports. The CSAF design criteria advocate enhancing the experiential qualities of grassroots sports by respecting, protecting and cultivating existing practices, meanings and values. We developed the CSAF by synthesising the theory, practice and evaluation components of our 2K-Reality design research project that sought to enhance the enjoyment of playing and watching pickup basketball with digital technology. The disciplines that contributed to our development of the CSAF include sports philosophy, sports psychology, games studies, public health and sports management.

**Keywords:** grassroots sport; deliberate play; eudaimonia; augmented reality; public health

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## 1. Introduction

In recent years, numerous quantified-self products—personal sensor-based devices that track performance metrics and provide analytical data as feedback on smartphones—have been marketed to participants in grassroots sports. Examples include the HomeCourt<sup>®</sup> video capture smartphone app for basketball, the Strike Smart Baseball, and the Head Tennis Sensor. These devices augment deliberate practice—structured sports training activities devised to improve performance [1].

Our 2K-Reality design research project explored an alternative approach. We adopted a normative ethical stance aligned with Sigmund Loland’s thick theory of athletic performance [2]—which regards sport as a social practice with norms and values worth respecting, protecting and cultivating—to augment an exemplary form of deliberate play. With this in mind, we focused on the sport of pickup basketball—the intrinsically motivated, peer-regulated, unstructured sports activity that mimics organised basketball to maximise enjoyment and provide immediate gratification [1]. We initiated our project by asking the following design research question: How can we design a sports technology innovation for pickup basketball that is compliant with the social practice and the spatiotemporal norms of the sport?

To address this question, we employed a meaning-driven innovation approach theorised by Norman and Verganti [3] in conjunction with Edmonds and Candy’s model of practitioner research for the interactive arts [4]. Our meaning-driven innovation process produced 2K-Reality—an acoustic-augmented reality installation designed to enhance the fun and joy inherent to pickup basketball [5]. This paper introduces the design framework generated by our model of practitioner research trajectory—the Compliant Sports Augmentation Framework (CSAF) for grassroots sports.

We suggest that sports technology designers can utilise the CSAF design criteria to assist a sociocultural-based approach to designing innovative grassroots sports technology—an alternative

to the predominant technological approach that has produced homogeneous quantified-self products for grassroots sports.

## 2. Methods

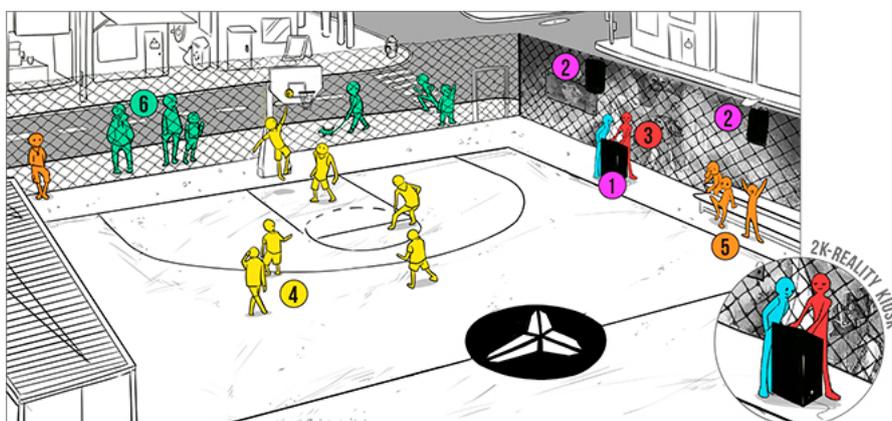
The 2K-Reality meaning-driven innovation process integrated the interpretive design approaches that comprise Norman and Verganti's Design Research Quadrangle framework: vision-driven research, bricolage, design-driven research and human-centred design (HCD) research [3]. We began by conducting vision-driven research, which included the exploration and interpretation of sociocultural factors that influence the practices, meanings and values of pickup basketball; and a transdisciplinary literature review of relevant contemporary discourses that surround grassroots sports. A bricolage event, which occurred during vision-driven research, inspired the 2K-Reality design and prompted the design-driven research process that produced a rapid prototype ready for testing in situ. Deployments of 2K-Reality in urban basketball playspaces—what Paulos and Jenkins call urban probes [6]—were used to conduct qualitative HCD research; more specifically, digital ethnography from a participant-observer perspective. This study method was approved by the Design and Social Context College Human Ethics Advisory Network—RMIT University (Project number: CHEAN A 0000018903-08/14); participants provided informed consent prior to data collection. HCD research findings informed the design of a second more-sophisticated 2K-Reality prototype, which was also tested in situ. Following Edmonds and Candy's model of practitioner research [4], we synthesised the theory, practice and evaluation components that informed the design and framed our understanding of 2K-Reality to present potential design implications in a framework—the CSAF.

## 3. Results

### 3.1. 2K-Reality

2K-Reality augments real-world pickup basketball with amplified sounds appropriated from the NBA 2K12 [7] videogame to expand and enhance NBA mimicry and make-believe. 2K-Reality blends the embodied pretending to play in the NBA performed by pickup basketball players with the mediated pretending to play in the NBA experienced by NBA-themed videogame players.

As illustrated in Figure 1, 2K-Reality is installed in pickup basketball playspaces. A pickup basketball spectator operates a tablet-based digital audio sampler housed in a kiosk connected to public address (P.A.) speakers. The 2K-Reality operator adopts the role of a make-believe NBA-arena DJ to perform NBA-themed soundscapes that articulate and amplify the aesthetics of the pickup basketball games they observe. The soundscapes immerse the court and surrounding playspace in a mix of broadcast-style commentary, arena-style crowd sound effects and contemporary music break beats.



**Figure 1.** 2K-Reality urban basketball playspace scenario. Legend: 1. 2K-Reality tablet-based kiosk; 2. Public address (P.A.) speakers; 3. 2K-Reality orchestrator; 4. Players; 5. Spectators; 6. Bystanders.

By synthesising our interpretive evaluation of 2K-Reality urban probes, we arrived at the following primary finding: 2K-Reality can enhance the enjoyment of playing and watching pickup basketball by inducing a positive manifestation of sonic agency, which cinematic theorist Michel Chion describes as ‘*plaisir de l’ergo-audition*’—the joy of hearing oneself [8]. Hence, by remediating NBA 2K12 videogame sounds to amplify the aesthetics of pickup basketball, 2K-Reality creates an immersive NBA-themed make-believe experience we describe as NBA-themed *plaisir de l’ergo-audition*—the joy of hearing oneself in the NBA.

Furthermore, our study indicates that 2K-Reality complies with the social practice and spatiotemporal norms of pickup basketball. Therefore, we defined 2K-Reality as a *compliant sports augmentation*—a term we coined to describe sports technology that does not alter the internal logic or disrupt the social norms and values of a grassroots sport. We subsequently developed the CSAF to assist the design of future sports technology that embraces a similar ethical stance.

### 3.2. The Compliant Sports Augmentation Framework (CSAF)

Our reflection upon the theory, practice and evaluation components of the 2K-Reality design research project determined the structure and content of the CSAF, as shown in Table 1.

**Table 1.** Compliant Sports Augmentation Framework.

Design Category		Dimensions	Minimise		Maximise
Internal Logic	1	<b>Spatial</b>	Intervention	↔	Consolidation
	2	<b>Temporal</b>	Interruption	↔	Integration
	3	<b>Practical</b>	Addition	↔	Enhancement
Values & Norms	4	<b>Social</b>	Personalisation	↔	Socialisation
	5	<b>Cultural</b>	Extraneous	↔	Inherent
Eudaimonia	6	<b>Attitude</b>	Outcome	↔	Process
	7	<b>Goal</b>	Evaluation	↔	Celebration
	8	<b>Gratification</b>	Delayed	↔	Immediate
	9	<b>Content</b>	Impression	↔	Expression
	10	<b>Interaction</b>	Surveillance	↔	Agency
Public Health	11	<b>Access</b>	Restricted	↔	Universal
	12	<b>Funding</b>	Personal	↔	Subsidised

The framework design categories and dimensions are primarily influenced by the thick theory technology in sport ethic articulated by sports philosopher Sigmund Loland [2]; the deliberate play concept proposed by sports psychologist Jean Côté [9]; the notion of designing for eudaimonia—the good life—in sports raised by play and games scholar Miguel Sicart [10], and grassroots sports development policy recommendations—published in international public health and sports management reports.

The ‘maximise’ design criteria represent the design implications derived from the attributes of the 2K-Reality sports technology design. The ‘minimise’ design criteria reflect the characteristics common to many existing forms of sports technology designed for grassroots sports—the quantified-self devices that prioritise evaluation and measurement and challenge the spatiotemporal norms and sociocultural values of deliberate play and unstructured sports activities.

Each of the twelve CSAF dimensions is an interrelated operator, and the design criteria represent ends of a continuum. We suggest that reflecting upon each dimension of the CSAF may assist designers in developing innovative grassroots sports technology. We do not suggest that meaningful grassroots sports technology needs to implement all the ‘maximise’ design criteria.

## 4. Discussion

Our rationale for designing 2K-Reality and developing the CSAF is related to public health and sports management research, which identifies adopting innovative technology and increasing physical activity through grassroots sports participation, as critical strategies for tackling the global physical inactivity pandemic [11]. Developing the CSAF was further motivated by the call from sports

entrepreneurship and innovation scholar Vanessa Ratten, who argues that interdisciplinary research approaches are needed to develop creative technology applications for the increasing number of people who experience sports in a casual form [12]—a commercial opportunity the Australian Sports Technologies Network regards as under utilised [13].

Accordingly, we developed the CSAF to assist the design abduction of grassroots sports technology that achieves the following outcomes: (i) maintains the structures and virtues of deliberate play and unstructured sports activities; (ii) promotes social interaction, creativity and fun; (iii) encourages participation and increases physical activity; and (iv) attracts sustainable public or private investment.

#### 4.1. Internal Logic

The spatial, temporal and practical dimensions of the CSAF concern the internal logic of sports—the rules of a sport that establish dynamic relationships between structural and functional elements and players [14]. The CSAF advocates maintaining the internal logic of grassroots sports to preserve norms and values derived from sport as a practice. As sports scientists Møller and Møller argue, technology is not a serious threat to sport unless it jeopardises the internal logic of sport [15].

1. The spatial dimension encourages the design of sports technology that consolidates and enhances existing playspace structures, for example, the flexible grassroots playspaces, such as playgrounds and parks, streets and driveways, backyards and beaches etc. The continuum also discourages the design of sports technology that may affect spatial play patterns by intervening within the boundaries of play.
2. The temporal dimension prioritises integrating sports technology with the rhythms of a sport—designs that accord with play action, play transitions and play breaks—and avoid interrupting the temporality of play patterns.
3. The practical dimension concerns the access and equity of sports equipment. The continuum promotes designs that maintain fairness by enhancing existing equipment in preference to adding elements or introducing new equipment that may contravene accepted norms.

2K-Reality consolidates and enhances public or privately owned public basketball playspaces with soundscapes that correspond to pickup basketball play patterns. Furthermore, 2K-Reality does not contravene the rules or standards codified by FIBA, basketball's governing body.

#### 4.2 Values and Norms

The social and cultural dimensions of the CSAF involve fostering social interaction—a primary motivation for participating in sport and physical activity [16]. The CSAF promotes the design of shared experiences for grassroots sports communities of practice; made meaningful through connections to existing forms of social interaction and the cultural influences that shape shared interests, beliefs and values.

4. The social dimension encourages sports technology designs that create inclusive social experiences, which promote, expand and support in-person social interactions, including intergenerational play. The continuum discourages sports technology primarily designed to augment individualism or designed for individual consumption in a social context.
5. The cultural dimension urges designers to identify, utilise, incorporate, modify, appropriate etc., the practices integral to the broader culture of a sport. The continuum prioritises sports technology designs that connect sports communities to other things they value, as opposed to appropriating extraneous design tropes from other sports.

2K-Reality is an immersive and shared computer-augmented environment that invites spectators to amplify the emergent narratives created by pickup basketball games. The basketball sociocultural factors that influenced the design of 2K-Reality and remain detectable in the design include: NBA mimicry and make-believe; showing off; turn-taking; the trickle-down effect from elite

to grassroots sports; hip hop culture; playspace acoustic augmentation; and NBA-themed entertainment—videogames, amusements and computer-augmented environments.

#### 4.3. *Eudaimonia*

The attitude, goal, gratification, content and interaction dimensions of the CSAF concern sports technology design attributes that may support eudaimonia—the good life; that is, human development and flourishing—in grassroots sports. Following Sicart, the CSAF urges designers to create playful designs that support autonomy, appropriation and expression by first identifying the aspects of an activity that make up the good life [10]. Accordingly, the ‘maximise’ design criteria prioritise increasing the affective benefits of participating in grassroots sport, which physical recreation scholars argue relies on fun, joy and a sense of happiness [17].

6. The attitude dimension calls for sports technology designs that focus on processes, not outcomes. The continuum encourages designers to support the autonomy of sports participants, the variations of sports they organise, and the rules of play they negotiate.
7. The goal dimension encourages the design of sports technology that celebrates the aesthetics of grassroots sports and creates memorable experiences, as opposed to evaluating and comparing aspects of performance or monitoring achievements.
8. The gratification dimension concerns the feedback sports technology provides to players and spectators. The continuum promotes designing sports technology that delivers unified-immediate feedback, rather than isolated-delayed feedback.
9. The content dimension prioritises sports technology designs that produce media to amplify, mix and share subjective expressions, rather than record, individuate and personalise objective impressions.
10. The interaction dimension discourages using sports technology for surveillance—capturing, storing and distributing personal data. The continuum encourages the design of benign technology that affords agency through appropriation.

2K-Reality supports autonomous soundscape performances that adapt to different forms of pickup basketball play; subjective soundscapes amplify and celebrate the aesthetics of pickup basketball games in real-time, and 2K-Reality does not use sensors or collect data in any form.

#### 4.4. *Public Health*

The access and funding dimensions concern availability and provision. The two dimensions specifically address public health and sports management policy recommendations for increasing physical activity through participation in grassroots sports. First, the call to improve public sports and recreation facilities. Second, the call to develop innovative strategies for attracting increased public and private funding for grassroots sport—an essential attribute for grassroots sports’ development [18].

11. The access dimension encourages the design of sports technology as public infrastructure or equipment that, in contrast to personal devices that typically restrict access, can be shared and accessed universally.
12. The funding dimension urges designers to consider economic models that can subsidise the implementation and maintenance of grassroots sports technology. The continuum promotes sports technology designs that minimise personal expenditure.

2K-Reality is designed as freely accessible infrastructure with the potential to be subsidised by a sonic branding strategy that links real and virtual grassroots basketball experiences.

## 5. Conclusions

The 2K-Reality acoustic-augmented reality installation demonstrates the potential of adopting a sociocultural-based approach to designing sports technology that seeks to enhance the fun and joy inherent to grassroots sports; in particular deliberate play and unstructured sports activities. The

CSAF, developed as a result of the 2K-Reality design research project, is proposed to assist the design of future sports technology that creates new technology-based experiences different from those produced by quantified-self devices. We acknowledge that further research is required to validate the CSAF more rigorously; we anticipate that future research will contribute to make revisions and refinements to the framework dimensions and design criteria.

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