

# Education as Jazz: What Can Educators Learn About Intrapreneurship from Miles Davis?

---

Ruben R. Puentedura, Ph.D.

# 1. Jazz as Metaphor

“Jazz is the only music in which the same note can be played  
night after night but differently each time.”

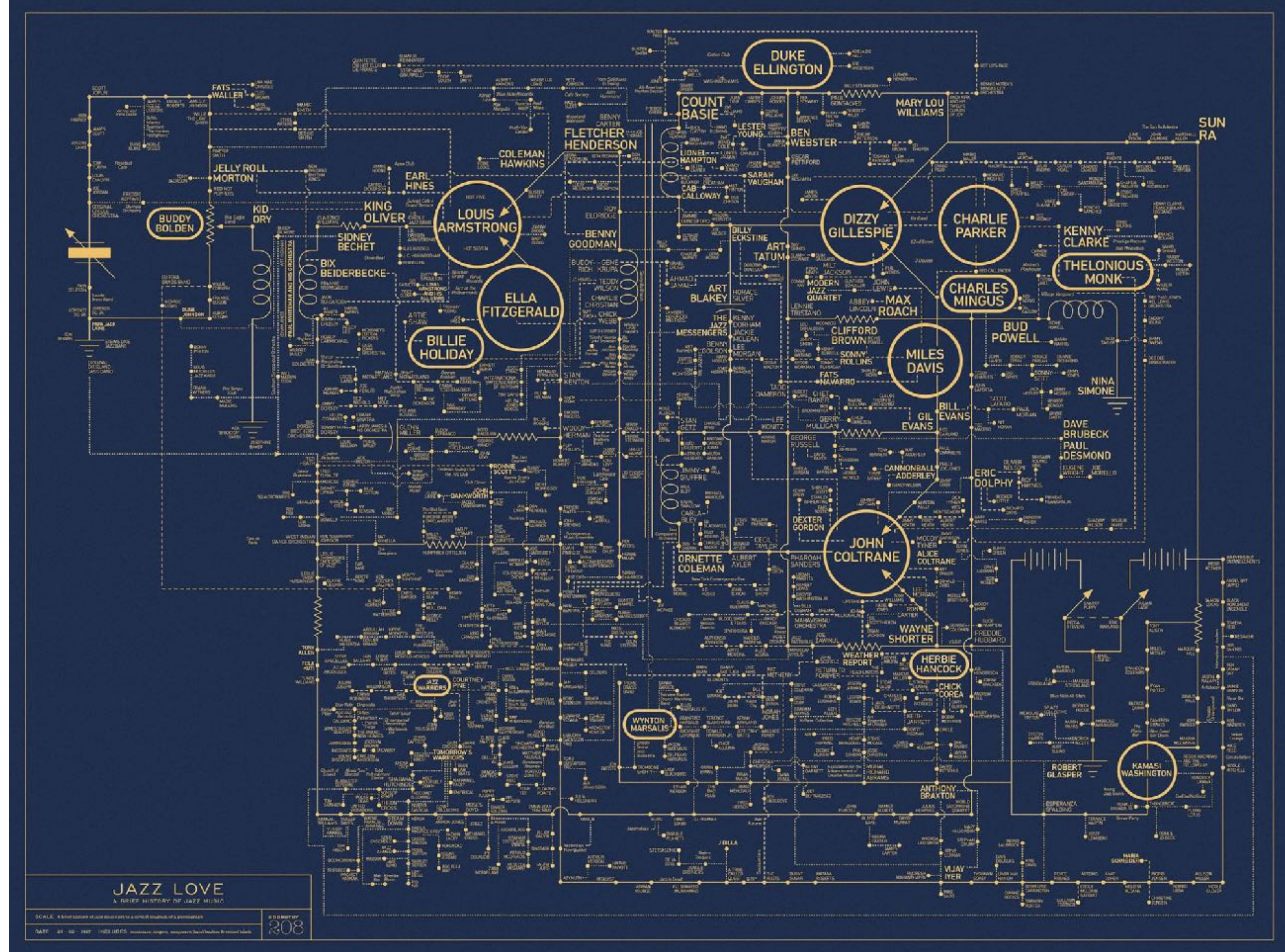
**–Ornette Coleman**











## Jazz Love Blueprint - A History of Jazz Music (© Dorothy)

<https://www.wearedorothy.com/collections/blueprints/products/jazz-love-blueprint-a-history-of-jazz-music>





Contents lists available at [ScienceDirect](#)

NeuroImage

journal homepage: [www.elsevier.com/locate/neuroimage](http://www.elsevier.com/locate/neuroimage)



## Dual-process contributions to creativity in jazz improvisations: An SPM-EEG study

David S. Rosen<sup>\*</sup>, Yongtaek Oh, Brian Erickson, Fengqing (Zoe) Zhang, Youngmoo E. Kim, John Kounios

*Creativity Research Laboratory, Department of Psychology, Drexel University, USA*

### ARTICLE INFO

**Keywords:**  
Creativity  
EEG  
Expertise  
Jazz improvisation  
SPM  
Surface laplacian

### ABSTRACT

Conflicting theories identify creativity either with frontal-lobe mediated (Type-2) executive control processes or (Type-1) associative processes that are disinhibited when executive control is relaxed. Musical (jazz) improvisation is an ecologically valid test-case to distinguish between these views because relatively slow, deliberate, executive-control processes should not dominate during high-quality, real-time improvisation. In the present study, jazz guitarists ( $n = 32$ ) improvised to novel chord sequences while 64-channel EEGs were recorded. Jazz experts rated each improvisation for creativity, technical proficiency and aesthetic appeal. Surface-Laplacian-transformed EEGs recorded during the performances were analyzed in the scalp-frequency domain using SPM12. Significant clusters of high-frequency (beta-band and gamma-band) activity were observed when higher-quality versus lower-quality improvisations were compared. Higher-quality improvisations were associated with predominantly posterior left-hemisphere activity; lower-quality improvisations were associated with right temporo-parietal and fronto-polar activity. However, after statistically controlling for experience (defined as the number of public performances previously given), performance quality was a function of right-hemisphere, largely right-frontal, activity. These results support the notion that superior creative production is associated with hypofrontality and right-hemisphere activity thereby supporting a dual-process model of creativity in which experience influences the balance between executive and associative processes. This study also highlights the idea that the functional neuroanatomy of creative production depends on whether creativity is defined in terms of the quality of products or the type of cognitive processes involved.

### 1. Introduction

Much research over the last decade has focused on the contribution of executive, Type-2 processes to creative cognition. The findings paint a complex picture. For example, the engagement of frontally-mediated, executive control processes can be beneficial in some domains, such as science, but deleterious in others, such as art and music (Kaufman et al., 2016; Shi et al., 2017). The phase of the creative process plays an important role, with creative ideation benefiting from less executive control and idea evaluation benefiting from more (Beaty et al., 2016, Ellamil et al., 2012). Furthermore, research has shown that greater executive control enhances the creativity of jazz improvisations for novices but hinders it for those with more expertise (Rosen et al., 2016, 2017). Such findings suggest that the contribution of executive processing to creative cognition depends on differences among both tasks and individuals.

The present study sought to further delineate the involvement of executive processing in creative cognition by isolating and comparing real-time neural correlates of creativity and experience during jazz improvisation.

Most studies that have addressed this issue have measured creativity with standardized psychometric tests or laboratory-based divergent or convergent thinking tasks. While such tasks are useful for isolating components of creative cognition, they are of limited ecological validity and domain specificity (Zeng et al., 2011). Alternative approaches that employ complex, naturalistic tasks may better represent creative cognition as it is manifested in real-world situations (Boccia et al., 2015).

Researchers have recently used jazz improvisation for this purpose (Limb and Braun, 2008; Beaty, 2015; Loui, 2018). Improvisation is an excellent test-case for the executive-control debate because the complexity and temporal demands of expert real-time improvisation should limit reliance on deliberate, effortful, Type-2 executive processing

<sup>\*</sup> Corresponding author.  
E-mail address: [durakis.rosen@gmail.com](mailto:durakis.rosen@gmail.com) (D.S. Rosen).

<https://doi.org/10.1016/j.neuroimage.2020.116632>

Received 3 September 2019; Received in revised form 5 February 2020; Accepted 10 February 2020

Available online 28 February 2020

1053-8119/© 2020 The Author(s). Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).







<https://doi.org/10.1038/s42005-022-00995-z> OPEN

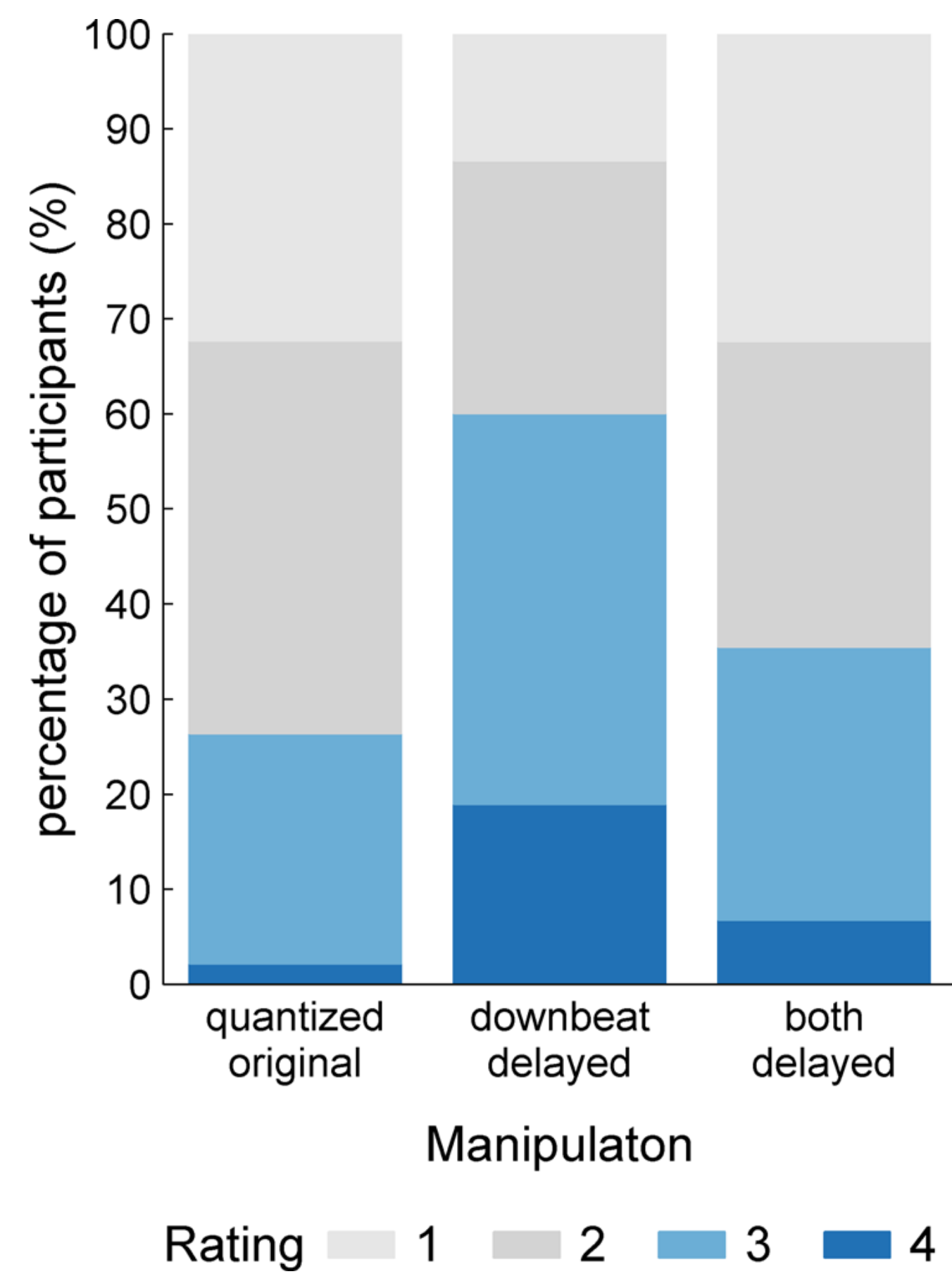
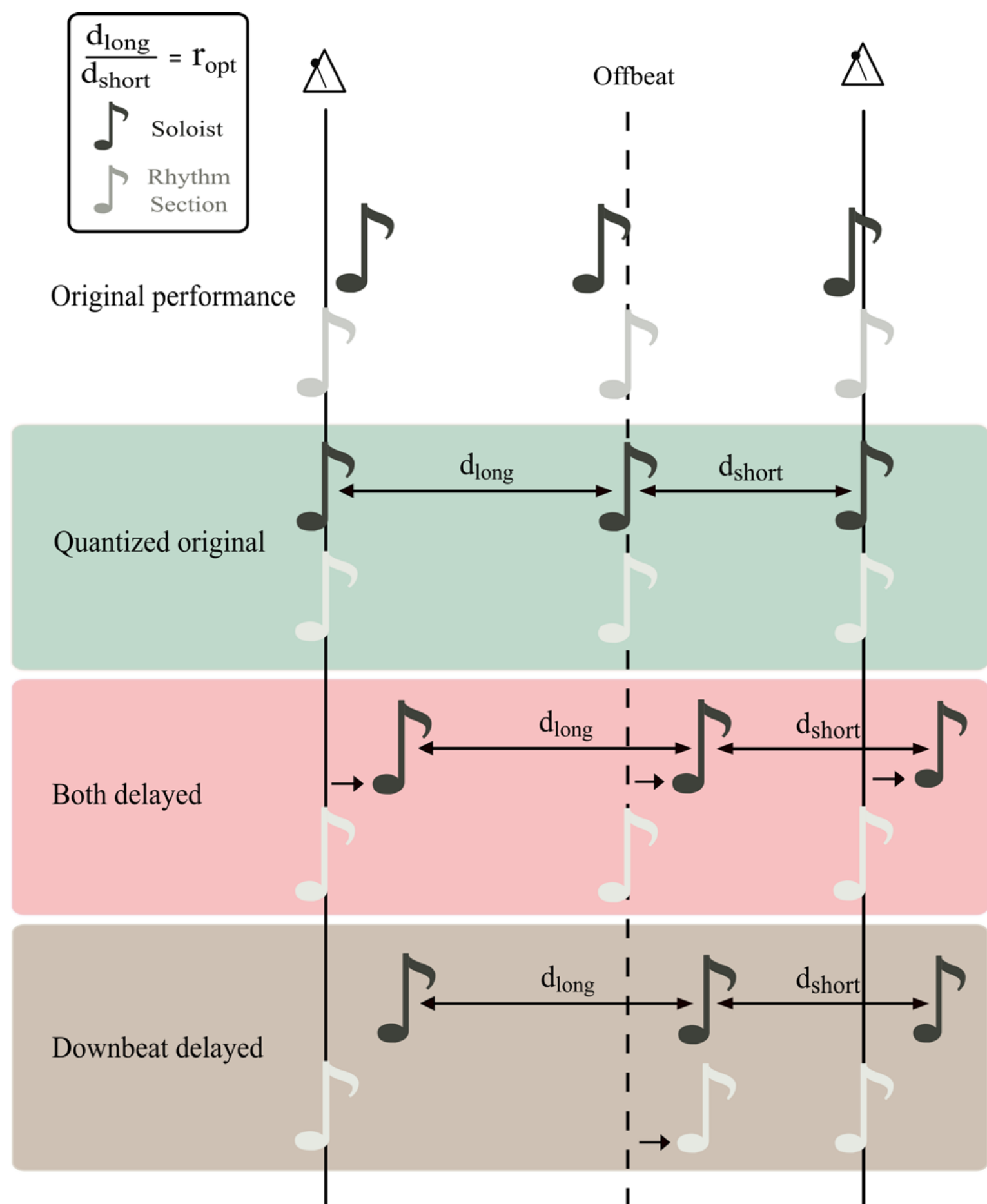
# Downbeat delays are a key component of swing in jazz

Corentin Nelias<sup>1,2</sup>, Eva Marit Sturm<sup>3</sup>, Thorsten Albrecht<sup>3</sup>, York Hagmayer<sup>3</sup> & Theo Geisel<sup>1,2,4</sup>✉

To which extent and how do jazz musicians synchronize their timing to create swing? Swing is a salient feature of jazz music, yet its main psychoacoustical and musical components have remained elusive—save the obvious long-short subdivision of quarter notes. In particular, the possible role of microtiming deviations for swing has been a subject of long-standing controversy. Adopting an operational definition of swing we present a study which ultimately demonstrates a positive effect of certain microtiming deviations on swing. We manipulate the timing of original piano recordings to carry out an experiment with professional and semi-professional jazz musicians measuring the swing of different timing conditions. Thereby we prove that slightly delayed downbeats and synchronized offbeats of a soloist with respect to a rhythm section enhance swing. Analyzing a set of 456 jazz improvisations we find that many jazz musicians do use minute downbeat delays. These results show that systematic micro-timing deviations in the form of downbeat delays are a key component of swing in jazz.

<sup>1</sup>Max Planck Institute for Dynamics and Self-Organization, 37077 Göttingen, Germany. <sup>2</sup>Department of Physics, Georg-August-University Göttingen, 37077 Göttingen, Germany. <sup>3</sup>Georg-Elias-Müller Institute of Psychology, Georg-August-University Göttingen, 37073 Göttingen, Germany. <sup>4</sup>Bernstein Center for Computational Neuroscience, 37077 Göttingen, Germany. ✉email: [theo.geisel@ds.mpg.de](mailto:theo.geisel@ds.mpg.de)







## 2. Jazz as Structure



## Transformation

### **Redefinition**

*Tech allows for the creation of new tasks,  
previously inconceivable*

### **Modification**

*Tech allows for significant task redesign*

---

### **Augmentation**




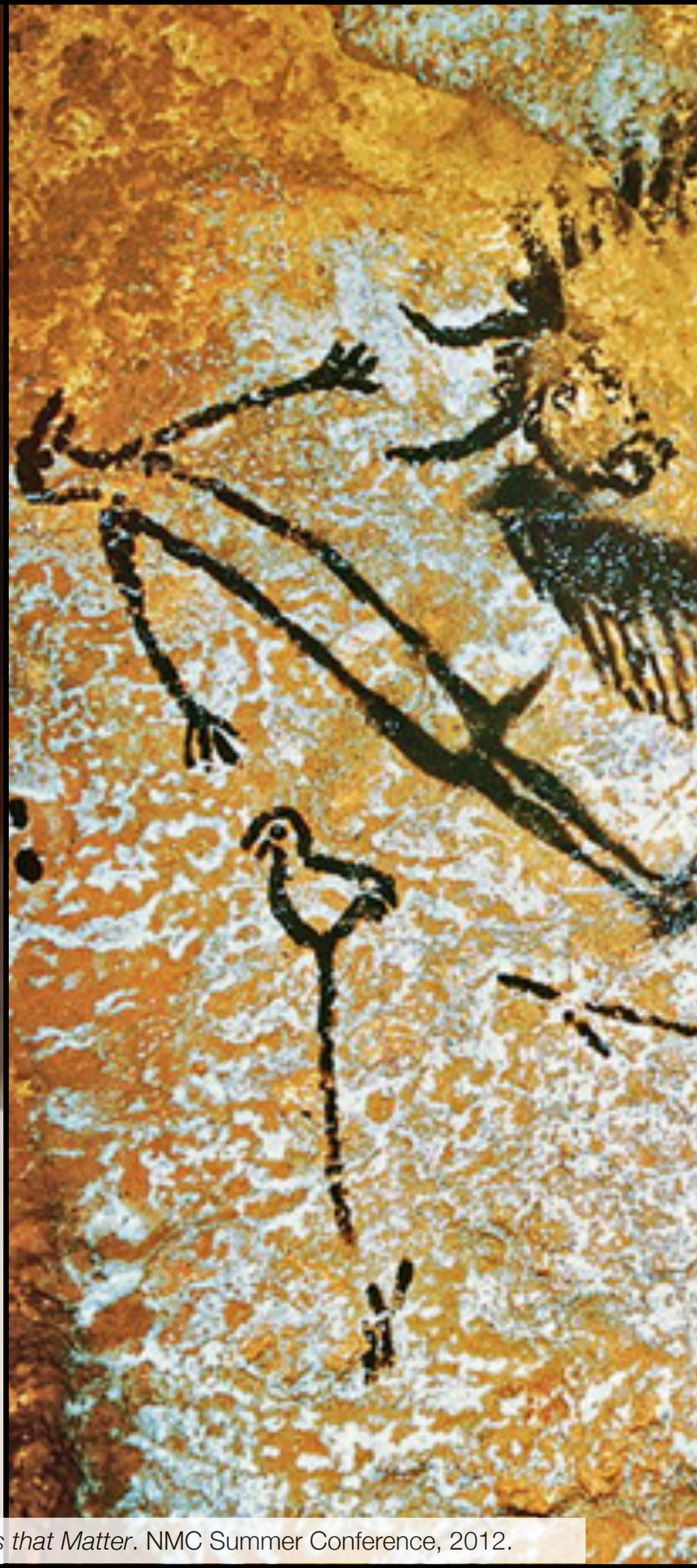

*Tech acts as a direct tool substitute,  
with functional improvement*

### **Substitution**

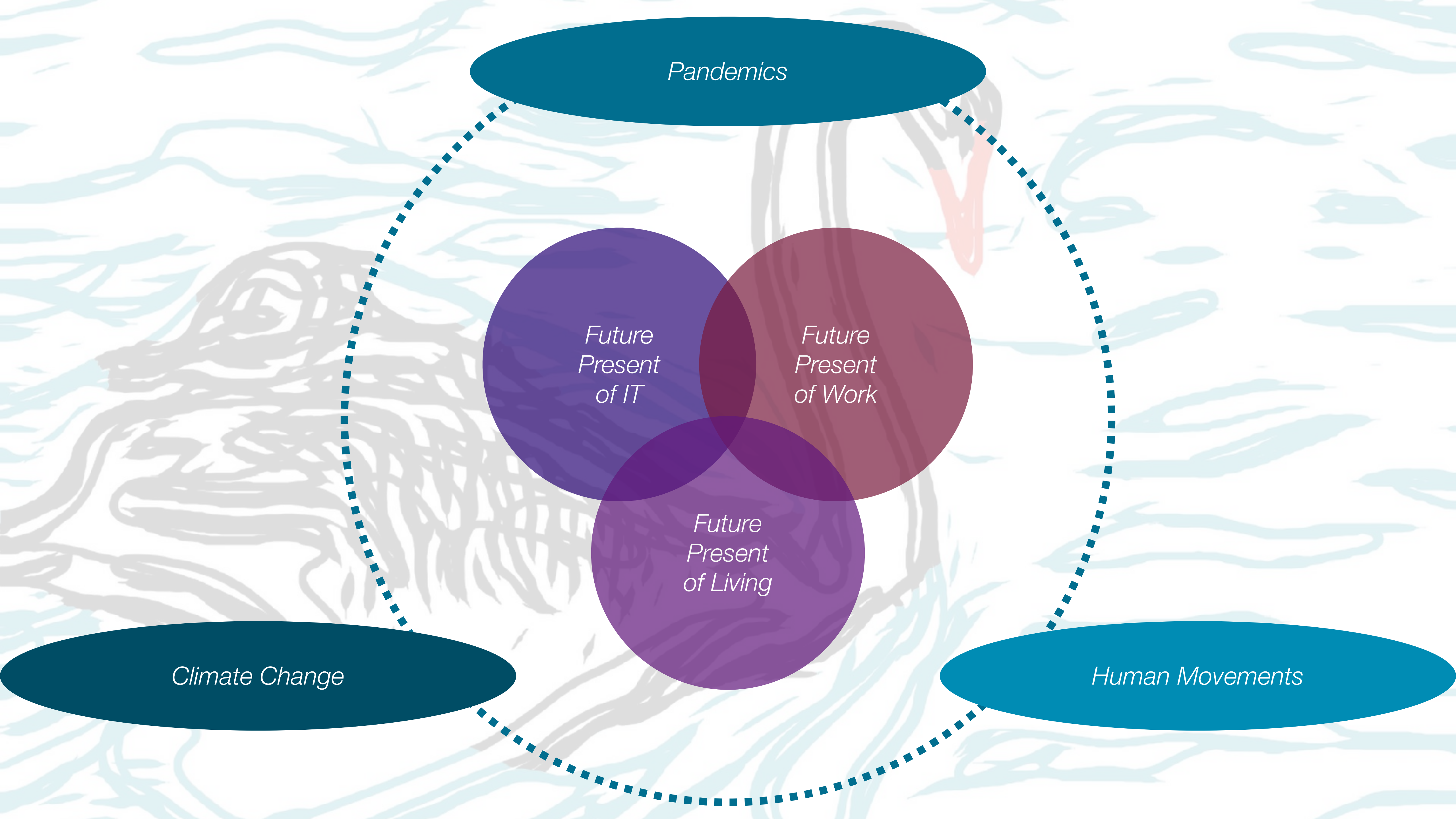
*Tech acts as a direct tool substitute,  
with no functional change*

## Enhancement



Social	Mobility	Visualization	Storytelling	Gaming
200,000 years	70,000 years	40,000 years	17,000 years	8,000 years
				







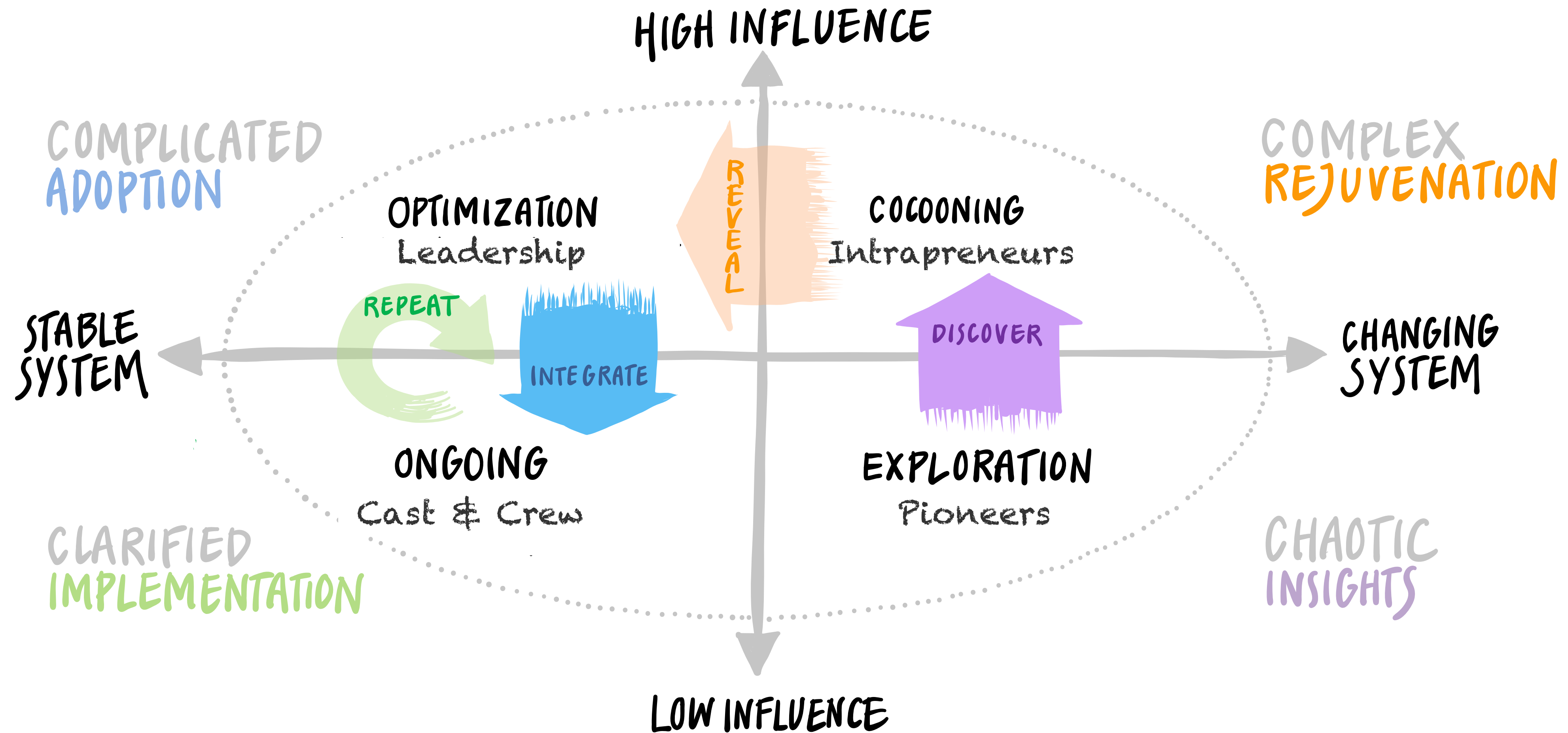
företagarpodden

Avsnitt 318: Nyckeln till innovation i småföretag

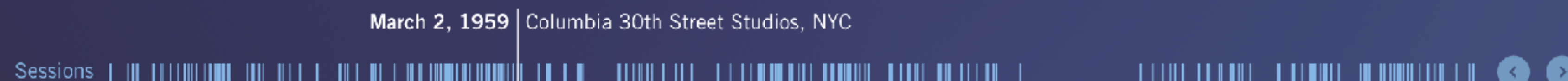
**Birgitte Stjärne och  
Albert Bengtson**

# The 4C Model

*The process of Transformative innovation*







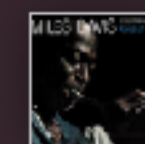
March 2, 1959 | Columbia 30th Street Studios, NYC

Miles Davis • trumpet

Paul Chambers • bass  
Jimmy Cobb • drums  
John Coltrane • tenor saxophone  
Wynton Kelly • piano  
Cannonball Adderley • alto saxophone  
Bill Evans (piano) • piano



Listen to All Blues (Kind Of Blue)



Kind Of Blue

**Scaled in Miles (© Fathom Information Design)**

<https://fathom.info/miles-web/>

“Trane never wrote anything down when he was with my band. All he did was just start off playing. [...] I'd say, "Trane, here are some chords, but don't play them like they are all the time, you know? Start in the middle sometimes and don't forget that you can play them up in thirds. [...] Trane was an innovator, and you have to say the right thing to people like that. That's why I'd tell him to begin in the middle, because that's the way his head worked anyway.”

**–Miles Davis**



“Jazz is at the top of the hierarchy of music because the musicians learned everything they could about music. Every time I used to see Coltrane he’d have Nicolas Slonimsky’s book. [...] Everything that Coltrane ever played was in that thesaurus. In fact, right near the front of that book, there’s a 12-tone example — it’s “Giant Steps.” Everyone thinks Coltrane wrote that, he didn’t. It’s Slonimsky. That book started all the jazz guys improvising in 12-tone.”

**–Quincy Jones**

Intrapreneurs

Pioneers

“I'd let Miles have a free hand in the studio and I always encouraged him to use electronic equipment because if we didn't have it, I'd order it. [...] He called me up in the middle of the night and said “Listen.” I said “Listen to what?” He plays something for 40 minutes on the phone. [...] Now, we might have recorded for five months and I said, oh, I need that, I need a piece there. I might go back into one of his tracks and take something out and put it in *Bitches Brew* and I'd do that with a lot of his stuff.”

**–Teo Macero**

“I didn’t really like the sessions at the time. I didn’t think they were exciting enough. But a short while later I was at the CBS offices, and a secretary was playing this incredible music. It was really smoking. So I asked her, ‘Who the hell is this?’ And she replied, ‘It’s that *Bitches Brew* thing.’ I thought, Damn, that’s great.”

**–Joe Zawinul**







DIRECTIONS IN MUSIC BY MILES DAVIS

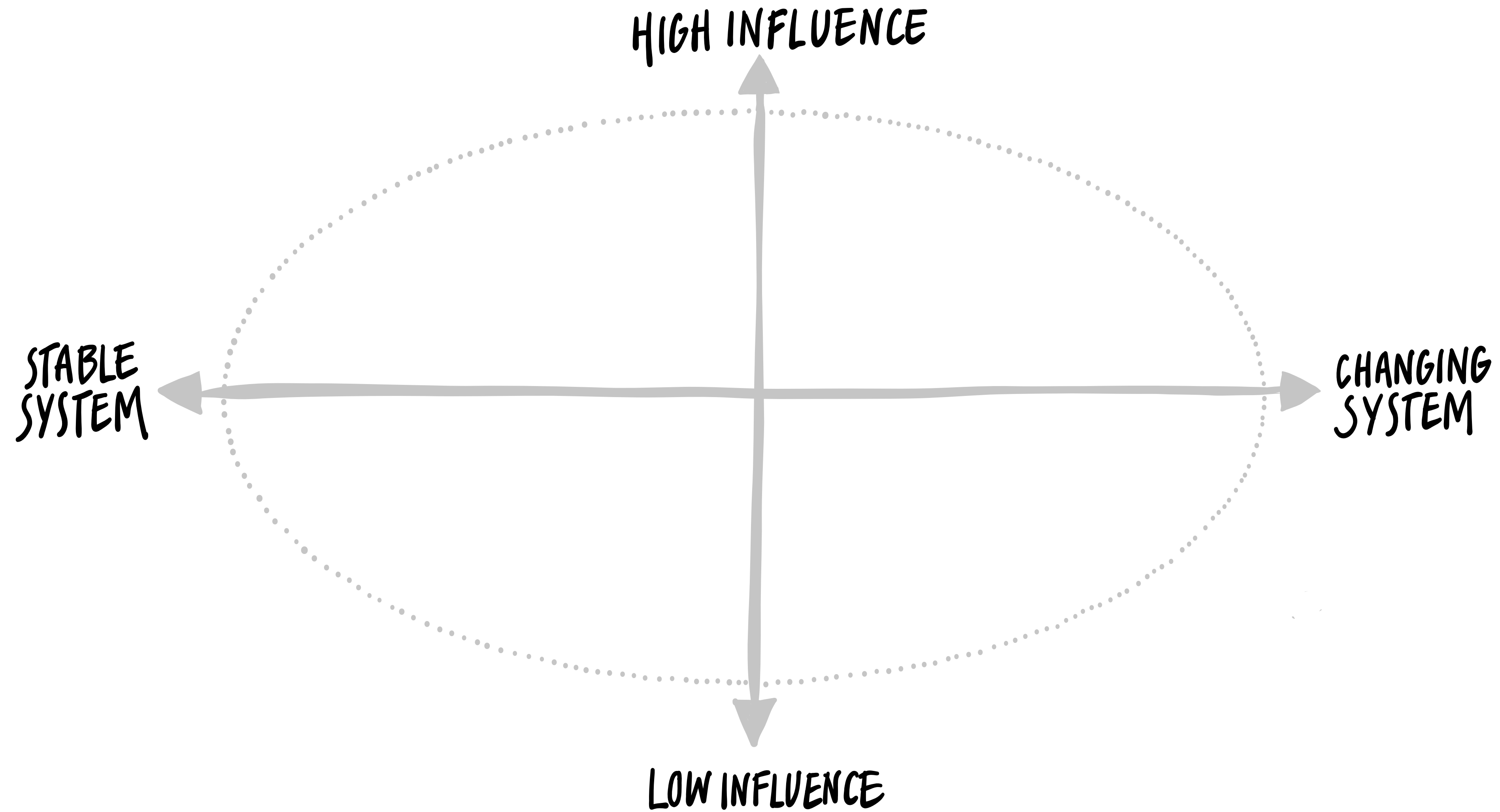
# MILES DAVIS BITCHES BREW





# The 4C Model

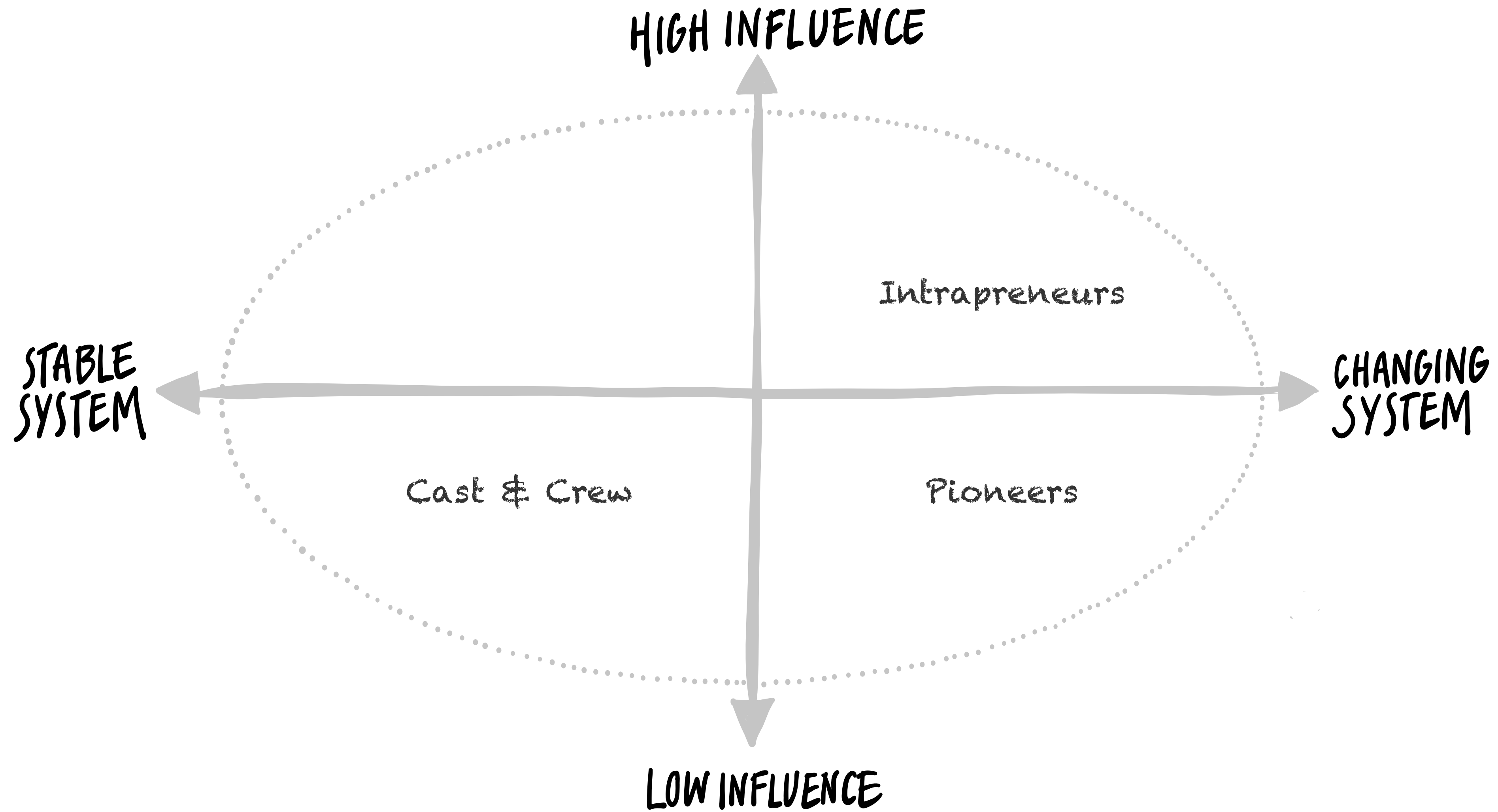
*The process of Transformative innovation*





# The 4C Model

*The process of Transformative innovation*



“That was the beginning of the end of my relationship with Columbia. That and the way that George Butler was treating me and Wynton Marsalis. [...] George Butler was the producer for both of us, and I felt that he was more concerned about Wynton's music than he was about mine. [...] Wynton was getting a lot of play because he was playing classical music and by this time he was winning all the awards, both in classical and in jazz music.”

**–Miles Davis**

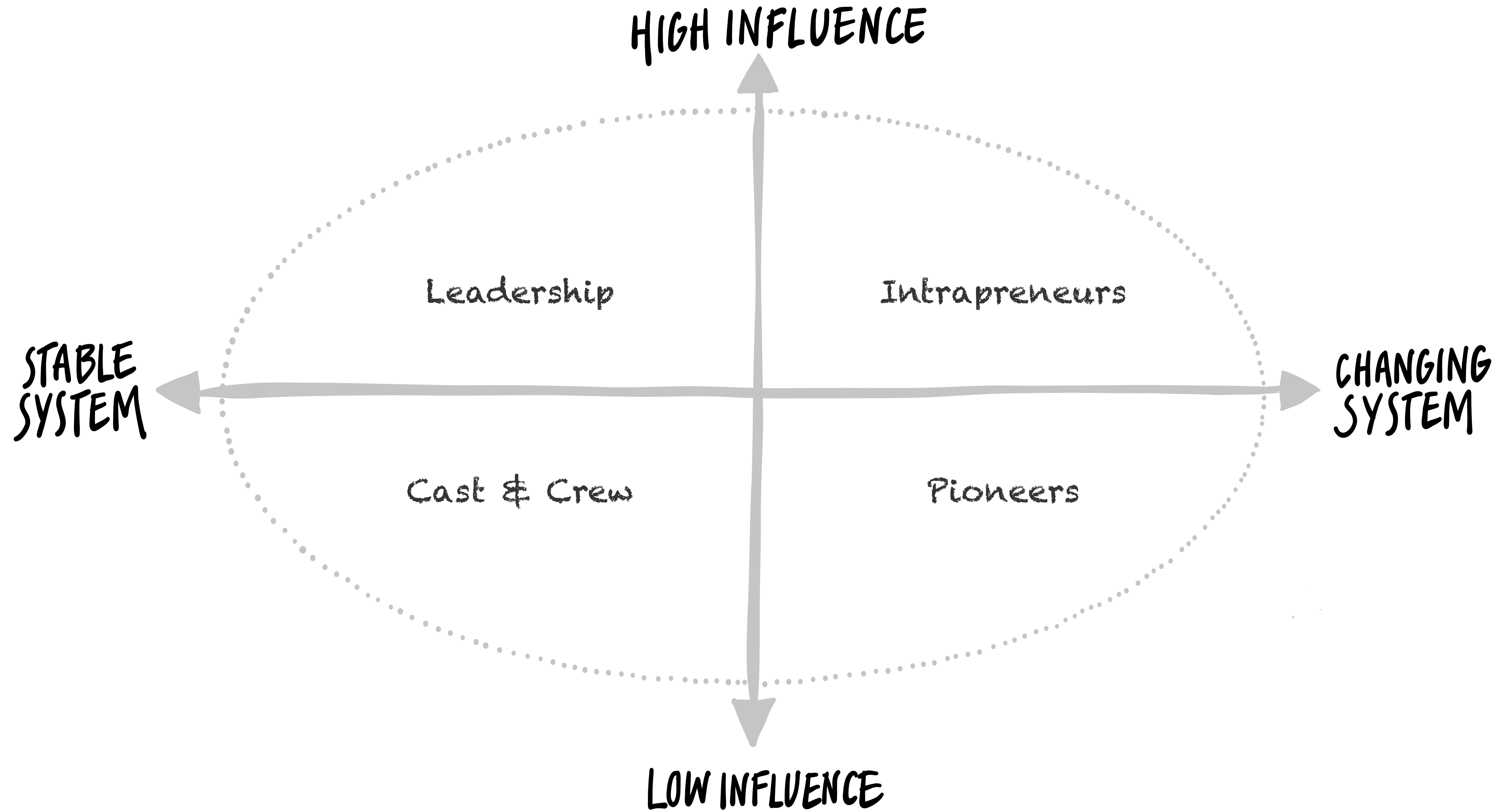






# The 4C Model

*The process of Transformative innovation*





### 3. Jazz as Practice

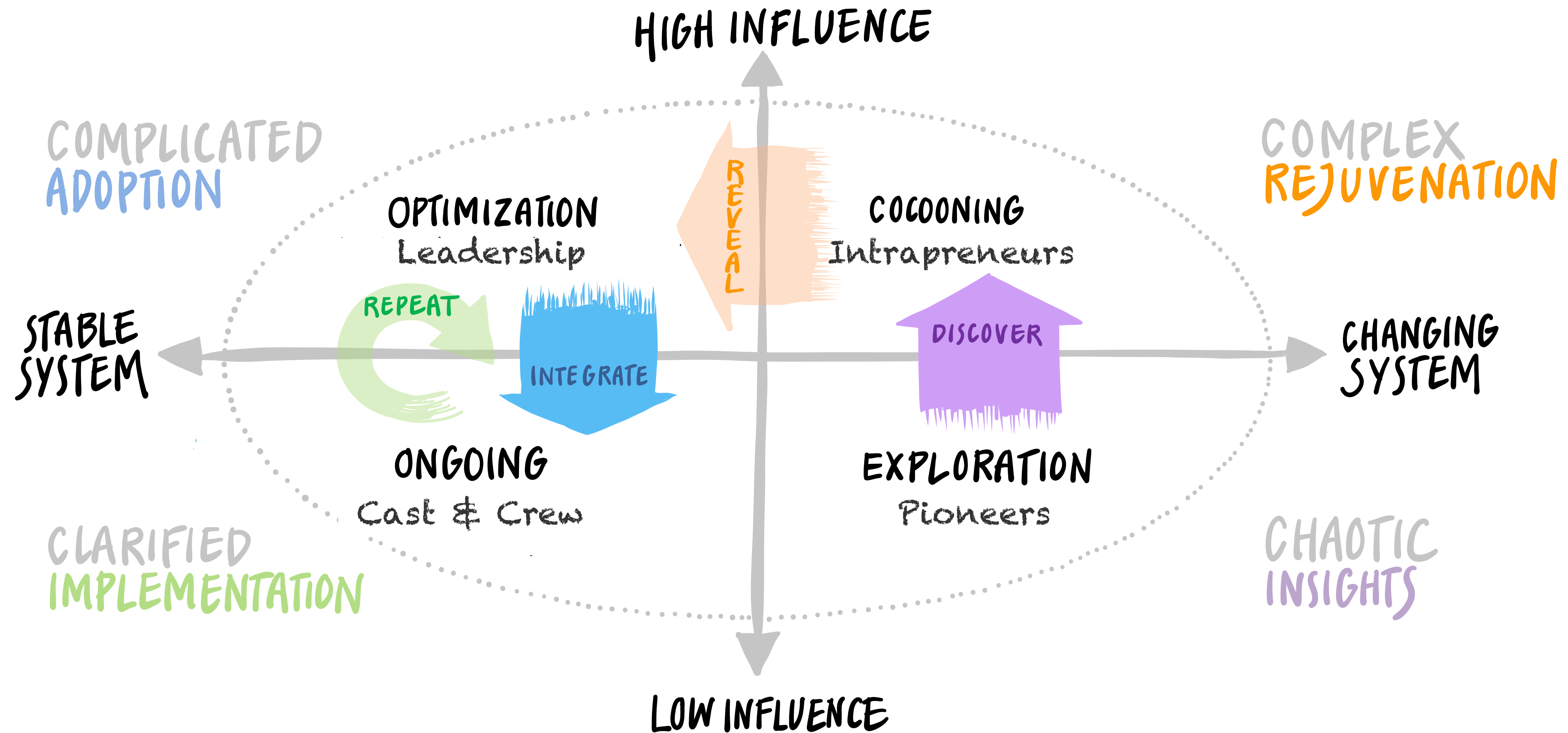
“Just look at the music’s timeline. It can hardly be a coincidence that jazz first emerged shortly after the rise of the record business: in a previous era, improvisations could hardly have been preserved, let alone packaged and put up for sale in the marketplace.”

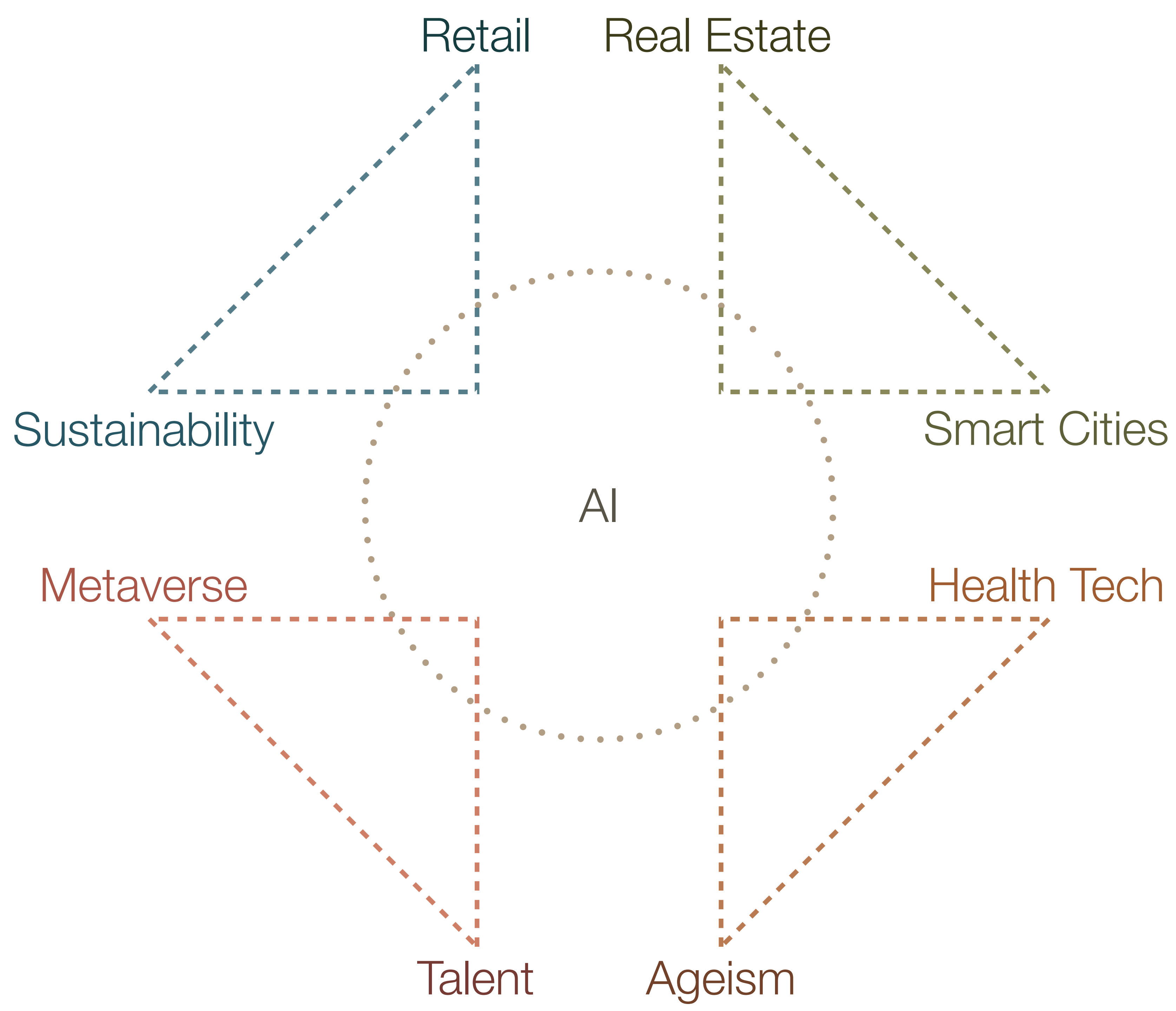
–Ted Gioia, *The History of Jazz*



# The 4C Model

*The process of Transformative innovation*

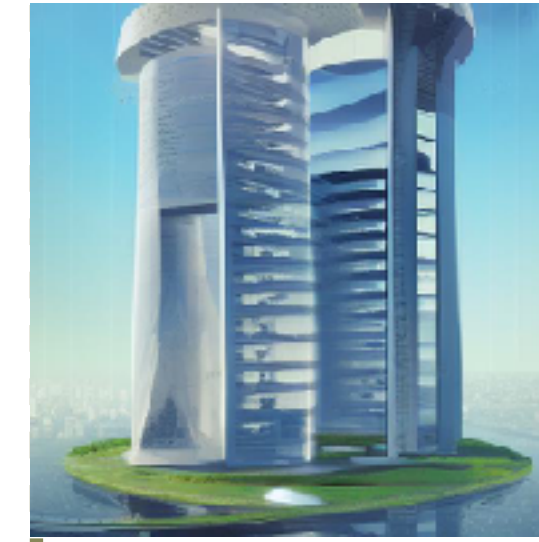






Retail

Real Estate



Sustainability

Smart Cities

AI

Metaverse

Health Tech



Talent

Ageism









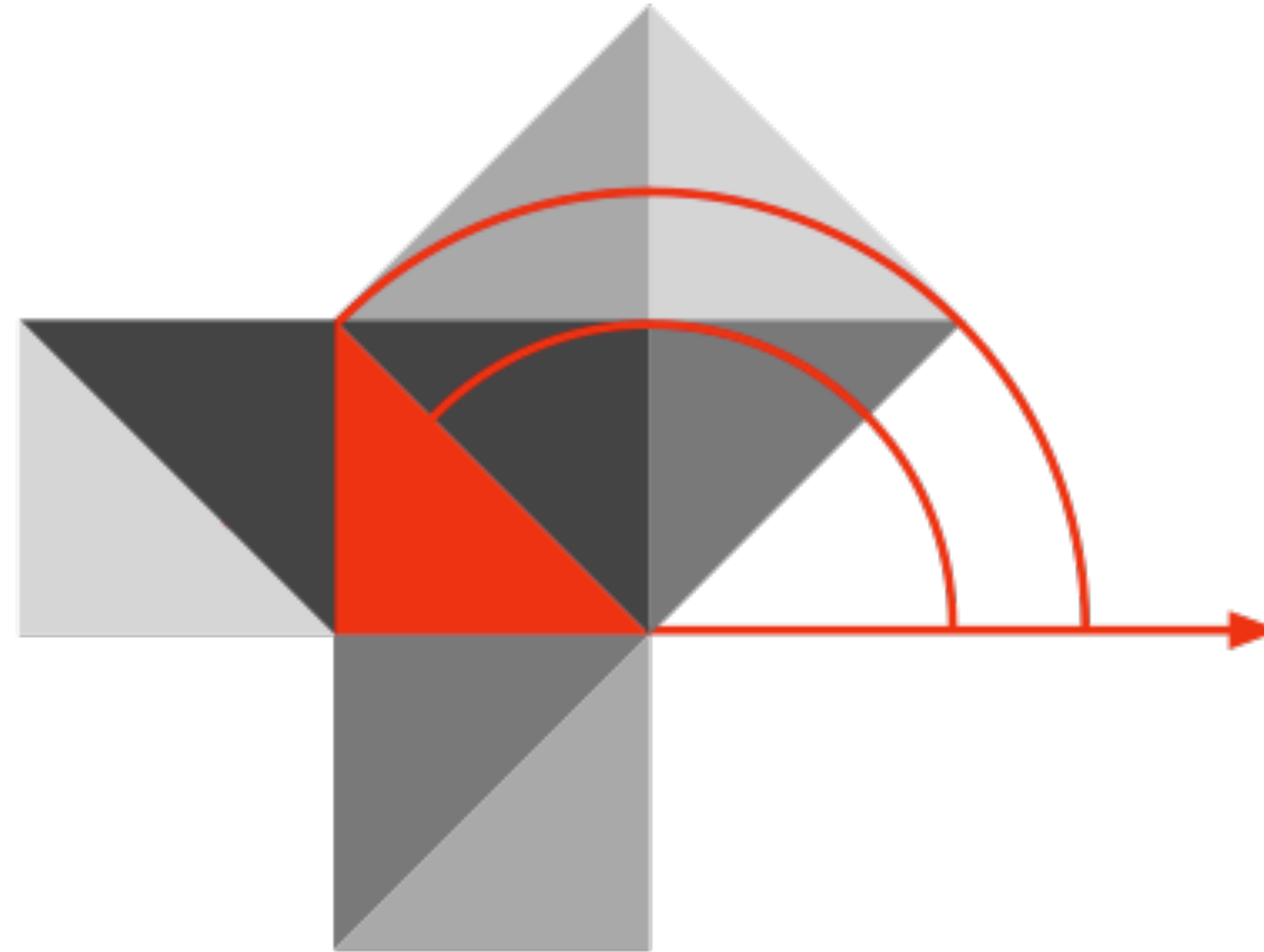






# Hippasus

---



Blog: <http://hippasus.com/blog/>

Email: [rubenrp@hippasus.com](mailto:rubenrp@hippasus.com)

Twitter: @rubenrp

This work is licensed under a Creative Commons Attribution-Noncommercial-Share Alike 3.0 License.

