

A Taxonomy for Analyzing Dashboard Design in XR based Content and Data Visualization Tool

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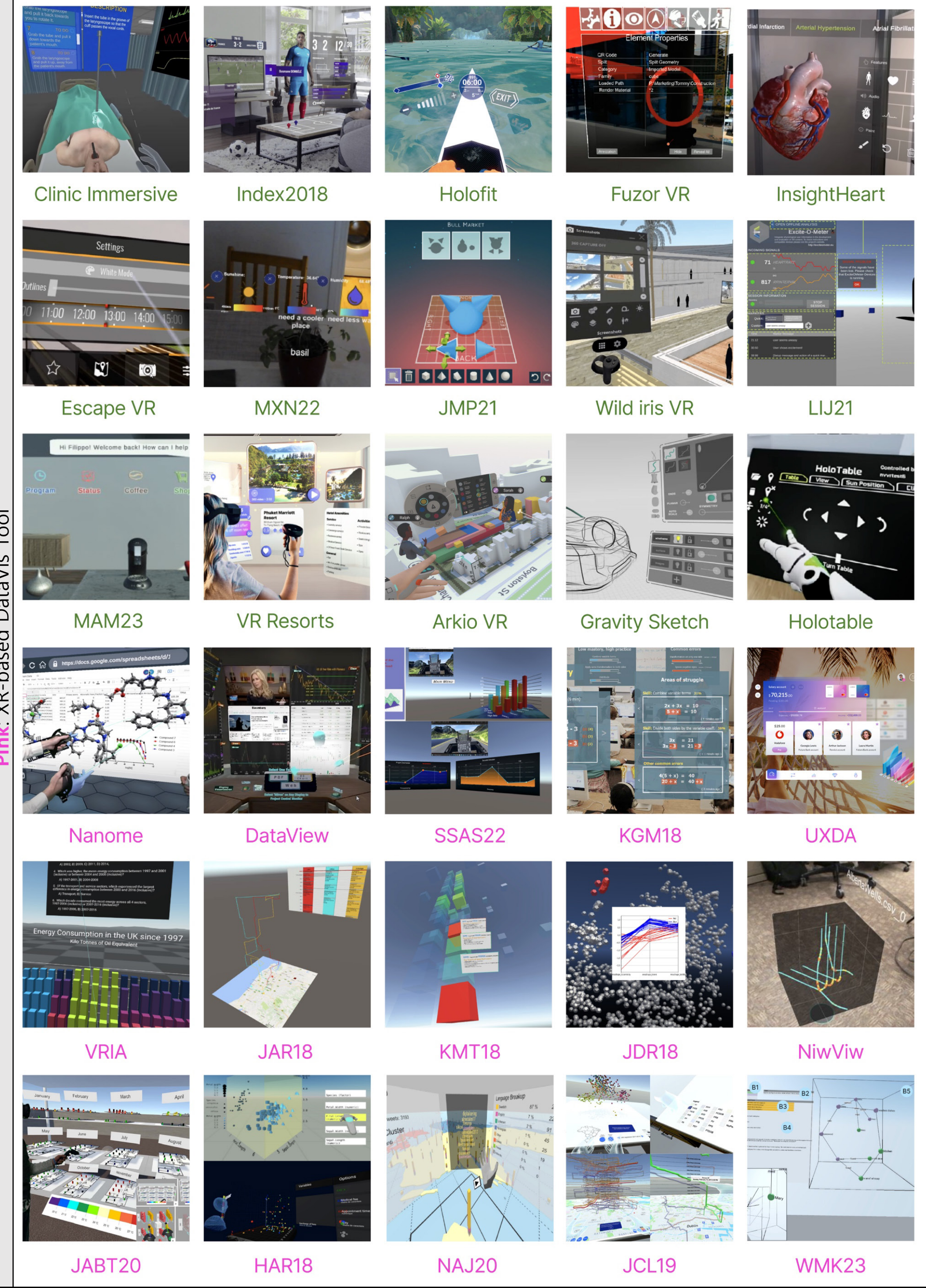
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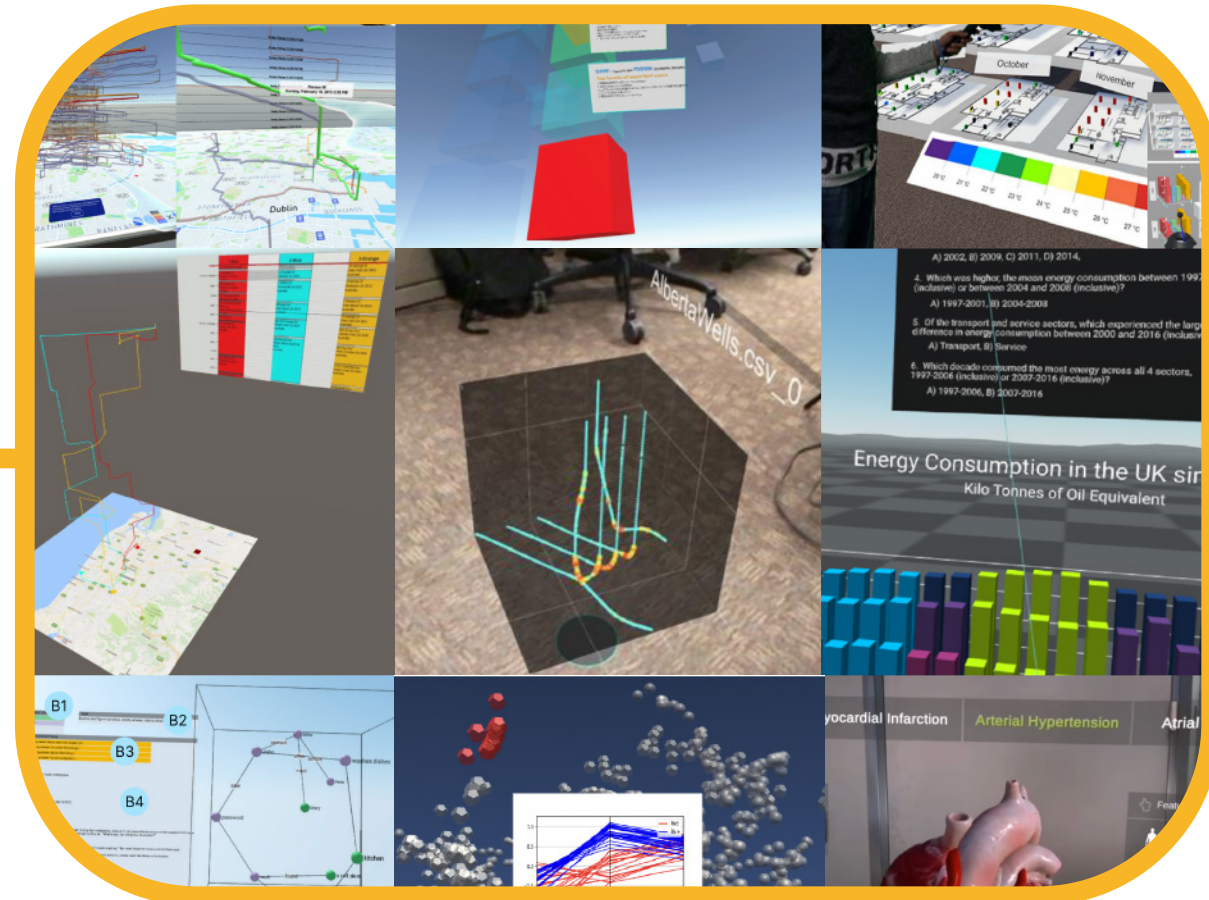
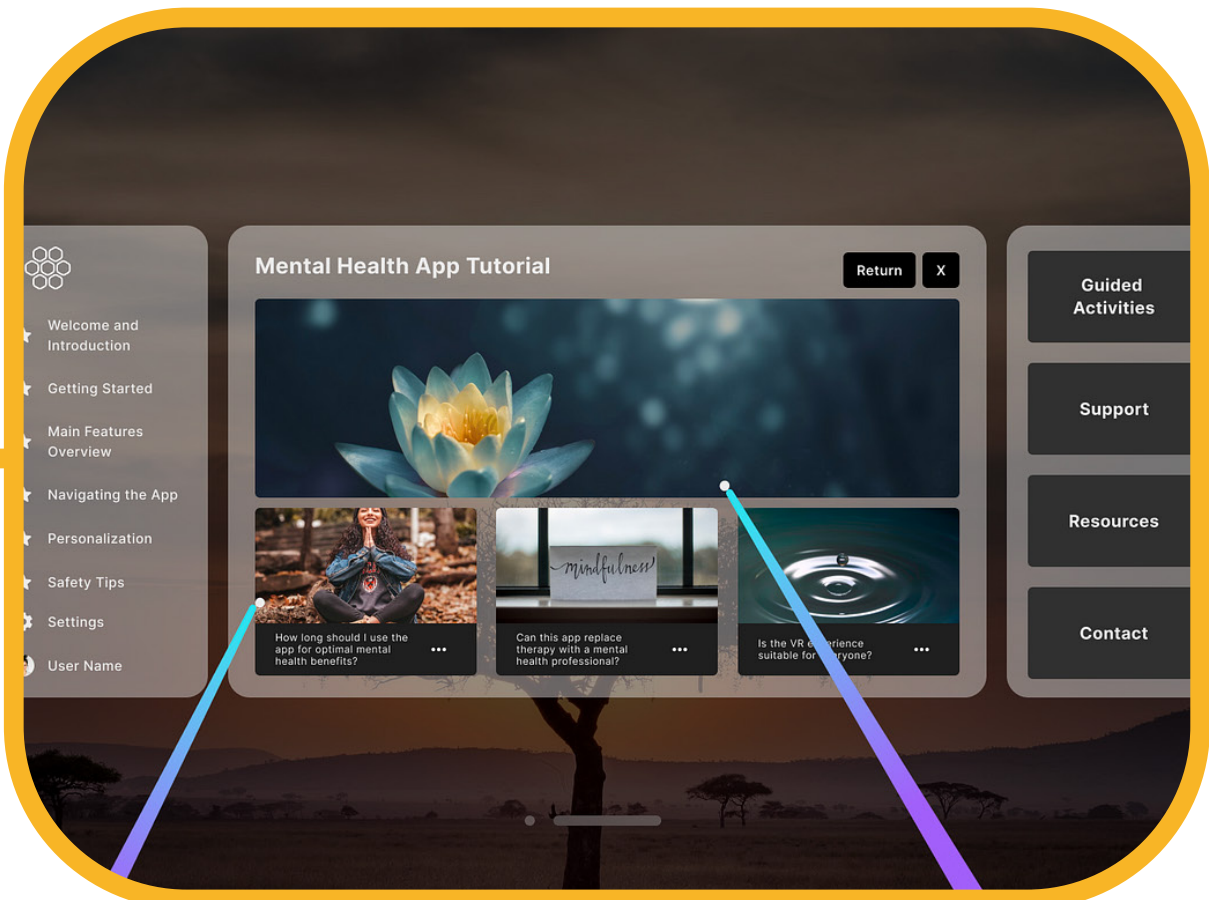


Main category	Sub category level 1	Sub category level 2	Clinic Immersives	Index2018	HoloFit	Fuzor VR	Insight Heart	Escape VR	MXN22	JMP21	Wild Iris VR	LIJ21	MAM23	VR Resorts	Arkiro VR	Gravity Sketch	HoloTable	Nanome	DataView	SSAS22	KGM18	UXDA	VRIA	JAR18	KMT18	JDR18	NiwViw	JABT20	HAR18	NAJ20	JCL19	WMK23	XR Content (COUNT)	XR-based DataVis Tool (COUNT)
Type of Data (Covered Field)	Categories of Data	Business																														2	1	
		Finance																															9	6
		Architecture																															7	7
		Educational																															11	11
Audience	Types of Audiences in terms of Utilization (group)	Medical																														2	1	
		Public																														2	5	
		Organization																														0	1	
Dashboard Implement	Intermediation in Dashboards	VR																														6	12	
		AR																														6	2	
	Interaction Device	MR																														6	2	
		Joystick																															5	4
Purpose of Dashboard	Strategic Dashboard	Controller																														4	8	
		Hand																															6	4
		Showing Directional																															3	4
		Representing Temporal Data																															3	7
	Analytical Dashboard	Evaluating																															11	5
		Monitoring																															12	11
	Operational Dashboard	Providing Context																															3	7
		Determine Cause and Effect																															3	9
		Verify Result and Quick Response																															7	2
		View Real-Time Event																															8	5
Dashboard Design	Layout	Providing Details																														6	5	
		Hierarchical																														1	4	
		Categorical																														7	6	
		Grouped																														0	2	
	Graphic and Metric	Schematic																															12	7
		Graph																															8	10
		Image																															8	5
		Icon and Pictogram																															12	7
		Text																															12	11
		Direction Controllers																															0	1
	Color	Table/List																															5	7
		Distinguishing Data																															9	11
		Encodings																															2	0
		Differentiating Colors for Different Users																															4	3
Dynamic Media	Theme																															2	1	
	Video																															2	3	
	Flash																															2	3	
Behavioral Design	Gesture-driven Dashboard																															1	5	
	Output/Movement																															12	5	
Spatial Design	Dashboard Layer	Single Layer																														3	10	
		Multi-layer																														11	12	
	Dashboard Placement	Target Centered Lock																														3	3	



A taxonomy for analyzing dashboard design in XR based content and data visualization tool and representative image of 30 cases

Research Introduction and Process



Since the growth of XR technologies, there has been a surge in the development of dashboards designed for immersive environments. These dashboards handle complex data visualization within XR, requiring unique design considerations.

However, applying traditional dashboard designs directly to XR environments can lead to cognitive overload. The need for customized design approaches in XR dashboards has become evident to enhance user experience and interaction.

To address this, we collaborated with experts to create a taxonomy that categorizes XR dashboard designs by factors like Type of Data, Audience Settings, Dashboard Implement, Purpose of Dashboard, Dashboard Design, Spatial Design.

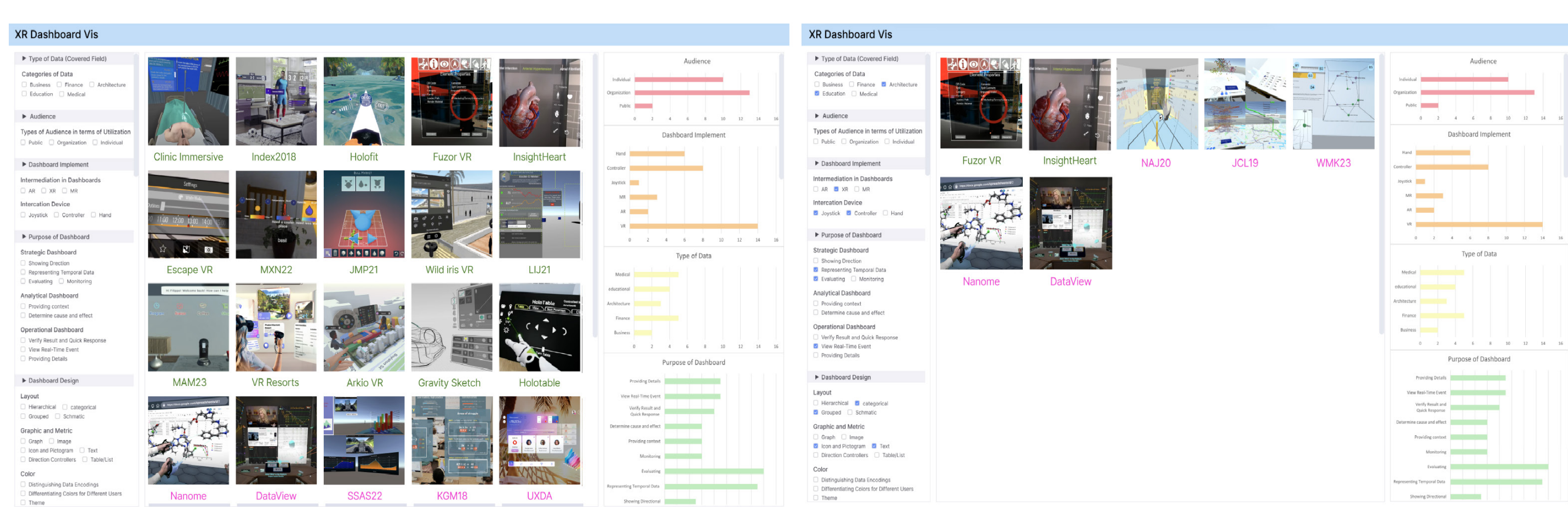
Using this taxonomy, 30 XR dashboard cases were analyzed to identify common design elements. The findings were then used to propose an exploration system that allows users to navigate and apply these design insights in future XR dashboard projects.

Case Analysis Example

Main category	Classification result of Kenneth Holstein et al. [3]	Representative image of Kenneth Holstein et al. [3]
Type of Data (Covered Field)	Categories of Data: Educational	
Audience	Types of Audiences in terms of Utilization: Organization, Individual	
Dashboard Implement	Intermediation in Dashboards: AR Interaction Device: Hand	
Purpose of Dashboard	Strategic Dashboard: Evaluating, Monitoring Interaction Device: Determine cause and effect	
Dashboard Design	Layout: Categorical Graphic & Metric: Graph, Icon and Pictogram, Text Color: Distinguishing Data Encodings	
Spatial Design	Dashboard Layer: Single Layer Dashboard Placement: Target Centered Lock	

Classification result of Kenneth Holstein et al. (See reference 3 in the abstract paper)

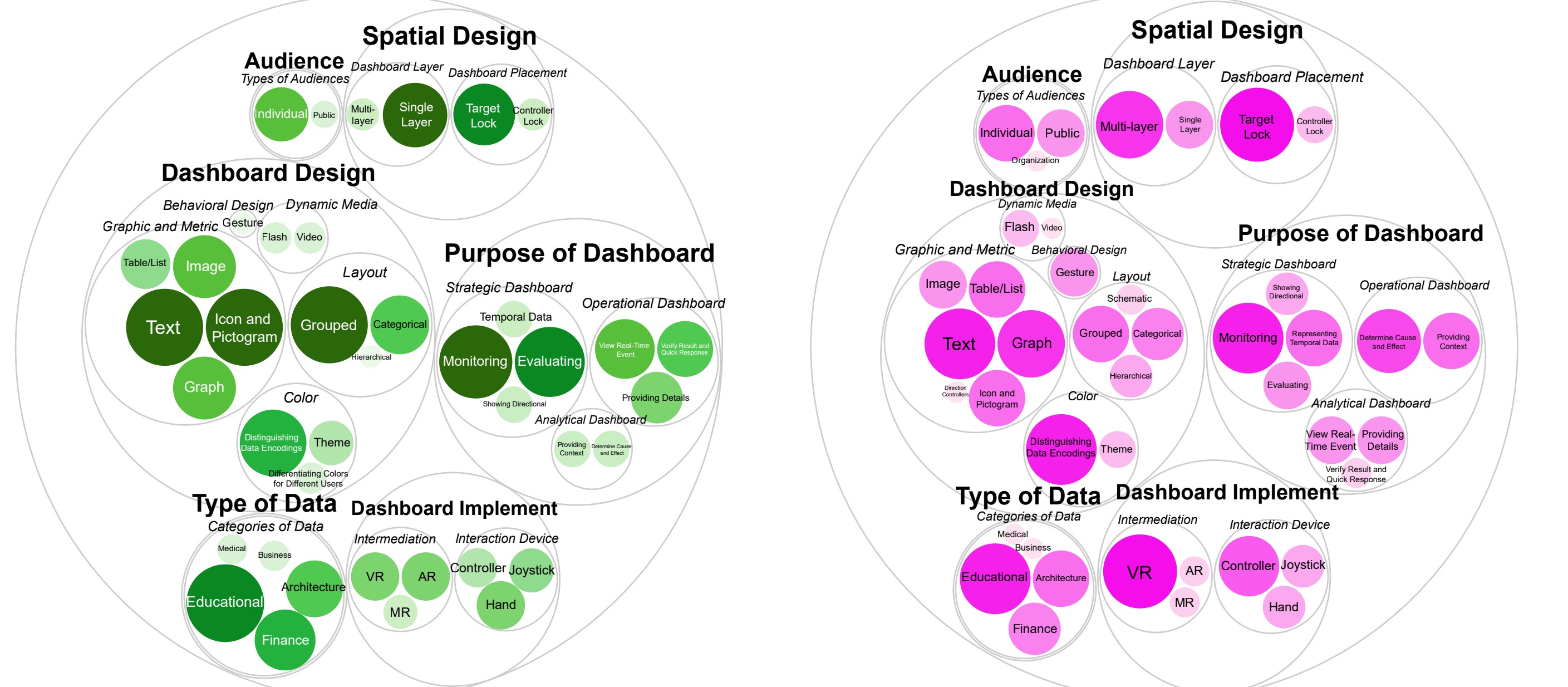
Future Research (Exploration System)



(a) Overview

(b) Example of extracting dashboard cases based on a combination of taxonomy criteria

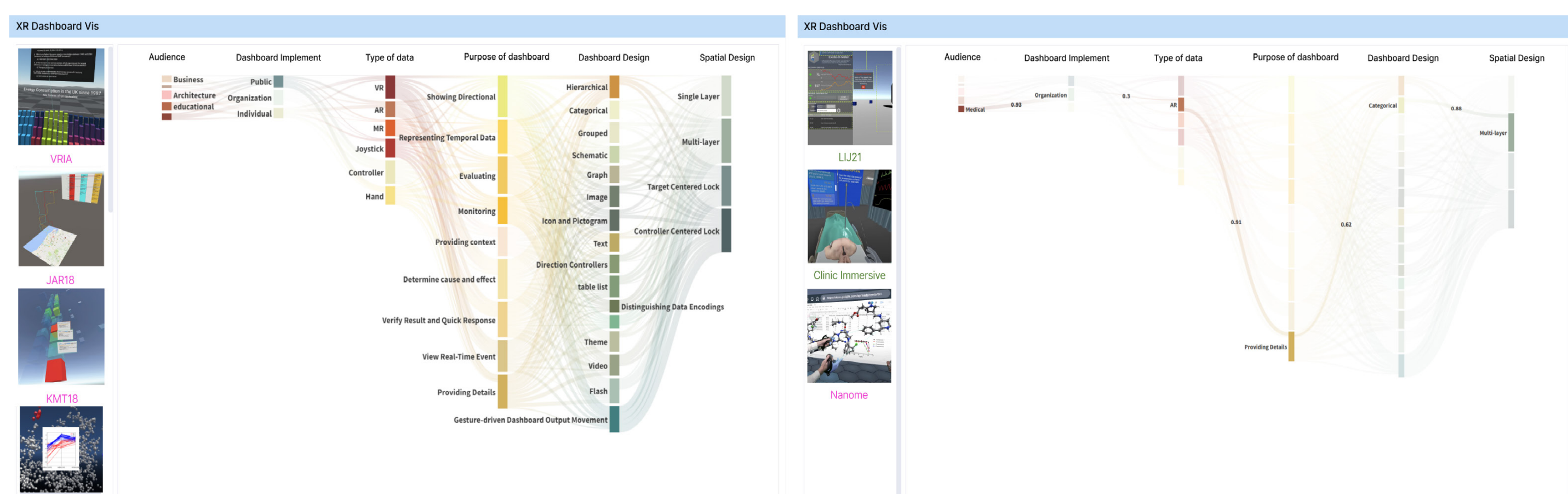
Case Frequency Report



XR Content

XR-based DataVisTool

Exploration system concept design 1: Image-based faceted search mode



(a) Overview

(b) Example of extracting dashboard cases based on a combination of taxonomy criteria

Exploration system concept design 2: Data visualization-based mode