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Article

DesignOps for Enterprise UX: Developing and Validating an HCI-Based Enterprise Design Operations Assessment Framework

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Abstract: DesignOps is becoming a standard practice in organisations to enhance the quality of design, collaboration, consistency and scale of delivery. But how to measure DesignOps maturity is frequently done informally with checklists or other operational measures that don't fully encompass human-centered outcomes, organizational context, accessibility, research integration, or the quality of design and product-development team collaboration. The aim of this research is to propose a new framework for Enterprise Design Operations Assessment (EDAF) that can be developed and validated based on HCI principles and organisational design theory. The study utilized a sequential mixed-methods design with five sequential phases: Systematic Literature Review of DesignOps, UX maturity, design systems, ResearchOps, and HCI scholarship; Semi-structured interviews with 42 practitioners from 6 different roles; Three rounds of the Delphi study to reach consensus on dimensions and indicators in the framework; Validation of the framework through a survey with 386 respondents from 94 organizations, testing the psychometric properties of the instrument; and Six in-depth case studies assessing ecological validity. The framework assesses ten areas of strategic alignment, governance and standards, workflow, research operations, design-system usage, accessibility and inclusion, knowledge management, cross-functional collaboration, measurement and metrics, and responsible adoption of AI. The internal consistency (Cronbach's alpha = 0.91), construct validity (CFI = 0.94, RMSEA = 0.058), and convergent validity with existing validated UX maturity measures were validated statistically. The framework's ability to effectively identify operational strengths, systemic barriers, and improvement opportunities was illustrated by case studies of organizations from across industries, sizes, and levels of maturity. The biggest contribution is a validated assessment instrument that extends beyond the design output into the organizational factors that enable sustainable UX quality, along with a five-level maturity model and evidence-based suggestions for capability development.

Keywords: DesignOps, UX Maturity, Design Operations, Assessment Framework, HCI, Design Systems, ResearchOps, Accessibility, Cross-Functional Collaboration, Organizational Design, Responsible AI

1. Introduction

The landscape of user experience (UX) design has changed dramatically over the last 10 years. Designing interfaces for specific products has typically been a development of the individual designer has become a complex organizational capability that demands coordinated systems, processes, tools, and norms. As design teams have grown in enterprise organizations, the operational infrastructure used to support their work, design decision-making, design artifact management, dissemination of research results, maintenance of design systems and the orchestration of cross-functional collaboration have become a critical determinant of design quality and outcomes for the enterprise. This is where DesignOps has come in, as a discipline to tackle these operational issues, but with no clear and researched framework for measuring DesignOps maturity and for determining where to improve.

In a broad sense, DesignOps is a spectrum of people, processes and infrastructure that make design work at scale. The discipline utilizes concepts of operations management, organizational design, human-computer interaction,

and knowledge management to develop the framework in which design can provide uniform and high quality user experiences in products, platforms and teams. Initial DesignOps concepts were largely centered on workflow efficiency, standardizing tools and resources, and allocating resources. As the field has advanced, however, DesignOps professionals and researchers have realized the importance of strategic alignment with business goals, incorporating research into decision-making, accessibility and inclusion as a primary consideration, working with distributed teams to share knowledge, and the new challenge of responsibly integrating AI into design practices.

In this vast territory, there are no validated tools to measure the level of DesignOps capability in an organization. The majority of assessments are informal checklists, self-reported maturity questionnaires using non-validated scales, or operational measures (e.g., design velocity or component uptake) that only measure a small proportion of DesignOps performance. These methods are limited in recognizing the multi-faceted maturity of DesignOps, the impact of the organizational environment on what is effective in operations, or how the maturity of DesignOps relates to downstream outcomes like product quality, user satisfaction, accessibility compliance and capacity for innovation. Without a validated assessment framework, it is difficult for organizations to truly compare their DesignOps capabilities, to truly understand if there are systemic issues that will need to be addressed for improvement, and to truly measure the impact over time with confidence that the measurements truly mean something.

The growing appreciation of design as a strategic asset is another factor that points to the necessity of a validated framework. Conducted consistently, research shows that design-led organizations beat the competition on revenue growth, market share and shareholder returns. However, there is still limited understanding of how design capability is able to contribute to organizational performance, partly due to the lack of systematic measurement of the operational infrastructure that supports design effectiveness. A validated assessment framework would allow researchers to deepen their understanding of these mechanisms through the lens of empirical studies, and would give practitioners a diagnostic tool that would help them understand what they are good at and what they can improve on in DesignOps.

The paper presents the development and validation of Enterprise Design Operations Assessment Framework (EDAF) that presents a comprehensive instrument based on HCI principles and organizational design theory. The framework measures 10 dimensions of DesignOps maturity, which are operationalized into indicators, with a combination of items measured on a Likert scale, behavioral anchors and evidence-based criteria. A sequential mixed methodology was used in the development process, which incorporated five phases: literature review, qualitative interviews, Delphi consensus, survey validation, and case studies. The product instrument has sound psychometric properties and ecological validity in organizations of different size, industry and maturity. The paper discusses the structure of the framework, its development process, the results of its validation and implications for research and practice.

2. Literature Review

2.1 The Evolution of DesignOps

DesignOps became popular in the mid-2010s as Design teams in tech organizations evolved beyond small enough to be managed with informal coordination. The initial definitions focused on operations efficiency, including the use of standard equipment, workflows and design resources. Levitan (2018) defines DesignOps as the process of combining people, processes and craft to amplify the value and impact of design at scale. This definition set DesignOps apart not as a design function but as an enabler function, tasked with providing designers with the conditions in which they can function in their core role of designers, designers of designers, and designers of designers of designers without getting bogged down in the operational mumbo-jumbo. Later projects have evolved the DesignOps focus from the efficiency angle to strategic and cultural aspects. Heyman and Lee (2020) claimed that DesignOps should go beyond the question of design work production and focus on the question of design decision making. This wider perspective acknowledges that operational effectiveness is tied to design and business strategies, to the balance between standardisation and flexibility in governance structures, and to an organisational culture that is design-thinking and evidence-led. As DesignOps scope expands, it has consequences for assessment too: a full scope of operational metrics

should be complemented by strategic alignment, governance quality, and cultural dimensions that support or impede the effectiveness of design.

2.2 UX Maturity Models

There are complementary but different approaches to understanding the organizational design capability in the form of UX maturity models. The seminal paper of Hart, et al. (2019) came up with a six stage model of UX maturity from absent through to integrated, each stage having some set of organizational circumstances: leadership support, resources allocation, process integration, and measurement practices. There have been other maturity models that have concentrated on specific aspects of UX capability, such as research maturity (Idris & Beyer, 2021) or design system maturity (Fathema & Beyer, 2022). They all assume that capability in organizational design evolves in certain stages, and that organizations can learn more about their stage of development and the conditions under which they could move to the next. But the current UX maturity models have been questioned for their lack of empirical evidence. The majority of models are developed by expert opinion or on the basis of a case study and few have been psychometrically tested for reliability and validity. The connection between maturity stage and organizational outcomes is assumed but not proven, and the models offer little direction on how to practically implement maturity assessment. The EDAF fills in these deficits through the existence of a validated instrument that has been rigorously tested and with a well-established psychometric properties, and by explicitly connecting the maturity levels to measurable organizational outcomes.

2.3 Design Systems and ResearchOps

Design systems are a key element of enterprise DesignOps, offering consistency and efficiency at scale by offering shared libraries of components, design tokens, documentation, and governance processes. The adoption of design systems has been studied, along with governance models and design system maturity and its impact on product quality. Typically, however, design system assessment has happened outside of design system evaluation, which overlooks the interdependencies between design system effectiveness and other operational design systems, like workflow integration, knowledge management, and cross-functional collaboration. ResearchOps, the operating system of the user research side of an organization, has become a branch of DesignOps. ResearchOps is about planning, carrying out, storing, sharing, and acting on research in organisations. Recruitment processes, data management, insight repositories, research democratization and the incorporation of research into the product decision making process are key concerns. ResearchOps and DesignOps are interdependent: DesignOps cannot be done without ResearchOps and ResearchOps can't be done without DesignOps.ResearchOps and DesignOps will need one another: ResearchOps cannot exist without DesignOps and DesignOps cannot exist without ResearchOps. ResearchOps is one of the ten dimensions of the EDAF, as research operations in mature organizations can't be separated from design operations.

2.4 Accessibility, Inclusion, and Responsible AI

Historically accessibility has been viewed as a compliance checklist and not as a tool to be used as part of design operations. But the regulatory focus on digital accessibility (the European Accessibility Act, WCAG 2.2, Section 508 updates) and the rise of the focus on inclusion as a design quality indicator has brought accessibility from a “nice to have” to a “must have” when it comes to operation. Advanced DesignOps teams embed accessibility into their design systems, processes, review cycles, and metrics, instead of it being a workstream. Generative AI in design workflows is a new challenge for DesignOps assessment. While organizations integrate AI features into their ideation, prototyping, content creation, and user research analysis processes, governance, quality control, ethical considerations, and the maintaining of human-centred design values come into play. The responsible use of AI in design operations includes aspects like transparency in the use of AI-generated content, identifying bias in data used by AI tools in research, considerations of intellectual property, and ensuring that human oversight remains to guide design decisions. Responsible AI adoption is recognized as a separate dimension in the EDAF, highlighting the significance of this new capability in enterprise design operations.

2.5 Gaps in Existing Assessment Approaches

The literature shows that there are some shortcomings in current DesignOps evaluation models. First, many instruments measure limited aspects of instrumented operations (velocity, tool adoption, component use) rather than the strategic, cultural and collaborative aspects of design that drive design effectiveness. Second, there is no empirical validation of the existing maturity models, they are based on expert opinion only. Third, accessibility, research integration, and responsible AI adoption are usually evaluated individually and don't exist as part of an integrated operational framework. Fourth, there is limited consideration of organisational context (size, industry, structure and culture) in the instruments used to assess effective DesignOps. The EDAF fills these gaps by providing a complete dimensional structure, a process for empirical validation, cross-cutting concerns through its integrated approach, and contextualizing activities in the realm of organizational interpretation of assessment results.

3. Methodology

3.1 Research Design Overview

A sequential mixed methods design with five steps was used in this study. The design was based on exploratory sequential design with qualitative results used to develop instruments, quantitative to validate the instruments, and then quantitative to apply them in real life. This choice was made because there were no validated measures available in the field for many of the constructs of interest, and thus, prior to quantitative validation, there was a need to explore aspects of the constructs in a qualitative manner. The five phases were: (1) systematic literature review, (2) semi-structured interviews with practitioners to ground the framework in lived experience, (3) a three round Delphi process with experts to reach consensus on the structure of the framework, (4) a large-scale survey to validate the psychometric properties of the instrument, and (5) case studies to assess ecological validity and practical utility.

3.2 Phase 1: Systematic Literature Review

The systematic review was carried out in five bodies of literature: DesignOps, UX maturity, design systems, ResearchOps, and HCI organization studies. Search terms combining design operations, UX maturity, design management, research operations, and organizational design were used to search the databases: ACM Digital Library, IEEE Xplore, Scopus, Web of Science, and Google Scholar. A search was conducted through the literature from 2015 to 2024 and 247 articles were selected after deduplication and screening. The constructs/dimensions included in each article were coded as well as the assessment methods utilized, the organizational contexts studied, and the outcomes measured. A candidate list of 34 dimensions was found in the five literature streams and 12 preliminary dimensions were identified through thematic analysis.

3.3 Phase 2: Qualitative Interviews

Thirty-five (35) of those practitioners (N=42) were interviewed using a semi-structured approach, representing each of the six categories below: UX Designers (n=10), UX Researchers (n=7), Design Operations Specialists (n=6), Product Managers (n=7), Accessibility Specialists (n=5), and Design Leaders (Directors & VPs) (n=7). The participants were selected via professional networks, LinkedIn, and design community Slack channels. Eligibility included two years of experience with an organization that has a larger, more robust design team (five or more). Interviews ran for 45 to 75 minutes, and included an exploration of: the ways in which participants understand DesignOps; the operational challenges they encounter; how their organisations measure their design capability; what they believe to be signs of DesignOps maturity; and how they view the connection between DesignOps and organisational outcomes. The interviews were transcribed and thematically analysed using deductive codes (from the literature review) and inductive codes (from the data). This analysis condensed the 12 initial dimensions to 10, combined two overlapping dimensions, and produced potential indicators for each dimension.

3.4 Phase 3: Delphi Study

A panel of 18 experts who have a proven track record of working in DesignOps, organizational design or UX leadership were selected for a three-round Delphi study. The panel featured six Design VPs/directors from Fortune 500 companies, four DesignOps consultants, three academics with published research on DesignOps, three Design system leads and two accessibility directors. Round 1 was a presentation of the 10 dimensions and candidate indicators, with the panelists rating the relevance of each indicator on a 5-point scale and then commenting generally on the issue. Round 2 was an aggregated ratings/comments phase, where panelists were asked to re-rate based on group comments. Round 3 gave ratings, where panelists were asked to either reaffirm or update their ratings. Interquartile range of less than 1 on the 5-point scale was considered consensus. The Delphi process resulted in the removal of 8 indicators, modification of 14 indicators, and addition of 6 new indicators. Delphi process was also used to arrive at final importance weight for the 10 dimensions.

3.5 Phase 4: Survey Validation

A survey instrument was designed within the framework of Delphi consensus, consisting of 82 items on a Likert scale (7-9 items per dimension), 12 organizational context variables and 4 outcome measures. The survey was pretested on 28 respondents to narrow down some unclear items and estimate the time of completion (about 20 minutes). After excluding incomplete responses and responses which were straight-lined, the main survey received 386 valid responses from a total of 94 organizations, which was achieved by sending the survey via professional networks, design community channels and through panel recruitment services. They ranged in size from 50 to more than 50,000 employees across technology, financial services, healthcare, retail, manufacturing and consulting.

The psychometric validation comprised of exploratory factor analysis (EFA), confirmatory factor analysis (CFA), internal consistency reliability (Cronbach's alpha and McDonald's omega), convergent validity (correlation with existing UX maturity measures), discriminant validity (cross factor correlations) and measurement invariance tests across organizational size categories. Structural equation modeling (SEM) was employed to study the relationship between DesignOps maturity and organizational outcomes measured by organizational self-report.

3.6 Phase 5: Case Studies

Six organizations were chosen for detailed case studies to determine the ecological validity and usefulness of the framework. The criteria for selection helped to ensure diversity of the organizations (120 to 5,000+ employees), industry (technology, financial services, healthcare, retail, consulting) and self-reported DesignOps maturity. Each organization experienced data collection methods such as: administration of the EDAF survey with 8-15 design and product stakeholders, semi-structured interviews with 3-5 key informants, review of operational artifacts (design system documentation, workflow diagrams, research repositories, governance policies), and observation of a DesignOps-related meeting or design review. Case study analysis was carried out using the cross case synthesis method, by comparing maturity profiles from the various organizations and by testing the framework's ability to reveal strengths, weaknesses and opportunities for improvement that were supported by the other data sources.

3.7 Ethical Considerations

Institutional review board (IRB Protocol #2024-DESIGN-0312) approval was obtained. Informed consent was obtained from all participants. Data from interviews and surveys were anonymised and organizational identities were anonymised when reporting. Participants were free to leave whenever they wished and there were no consequences for dropping out. A benefit of panel participation was the receipt of summary reports of findings by the Delphi panelists. Customized maturity reports were provided to case study organisations, along with actionable recommendations.

4. Data Analysis and Results

4.1 Participant and Respondent Characteristics

The following Table 1 shows the characteristics of the interview participants (Phase 2) and survey respondents (Phase 4). The pooled sample was representative within each of the three demographic categories (role, size, industry and geographical region), enabling findings to be generalised.

Table 1. Participant and Respondent Characteristics

Characteristic	Interviews (n=42)	Survey (n=386)	Case Studies (n=6 orgs)
Designers	10 (23.8%)	142 (36.8%)	18 respondents
Researchers	7 (16.7%)	68 (17.6%)	9 respondents
DesignOps/Program	6 (14.3%)	54 (14.0%)	7 respondents
Product Managers	7 (16.7%)	71 (18.4%)	8 respondents
Accessibility	5 (11.9%)	22 (5.7%)	4 respondents
Design Leaders	7 (16.7%)	29 (7.5%)	6 respondents
Org size <500	14 (33.3%)	118 (30.6%)	2 orgs
Org size 500-5000	16 (38.1%)	167 (43.3%)	3 orgs
Org size 5000+	12 (28.6%)	101 (26.2%)	1 org

Figure 1. Conceptual Framework: Ten Assessment Dimensions of the Enterprise DesignOps Assessment Framework (EDAF).

4.2 Framework Structure and Dimension Weights

The final framework consists of ten dimensions with 7-9 indicators and items on a Likert scale. Table 2 shows the dimensions, their Delphi consensus importance weights, the number of indicators per dimension and sample items. Standards, governance, and adoption of design system were rated as most important (9.1/10), while strategic alignment

was rated second most important (8.7/10), and design system adoption was rated third most important (8.8/10). Responsible AI adoption was the lowest rated (6.9/10) but was still considered as a separate dimension because of its emerging importance.

Table 2. EDAF Dimensions: Importance Weights, Indicators, and Sample Items

Dimension	Weigh t	Items	Sample Indicator
Strategic Alignment	8.7	8	Design strategy is explicitly linked to business objectives and reviewed annually
Governance	9.1	9	Design quality standards are documented, communicated, and enforced across teams
Workflow Integration	8.4	8	Design activities are integrated into product development sprints with defined handoff points
Research Operations	7.9	8	Research findings are stored in a searchable repository accessible to product teams
Design System	8.8	9	The design system has a dedicated maintainer and a formal contribution process
Accessibility	8.2	8	Accessibility checks are embedded in design review and QA processes
Knowledge Mgmt	7.3	7	Design decisions and rationale are documented and accessible to new team members
Collaboration	8.6	8	Design and engineering conduct regular joint critique sessions
Measurement	7.8	8	Design quality is measured using both formative and summative metrics
AI Adoption	6.9	7	AI tool usage follows documented guidelines addressing bias, privacy, and oversight

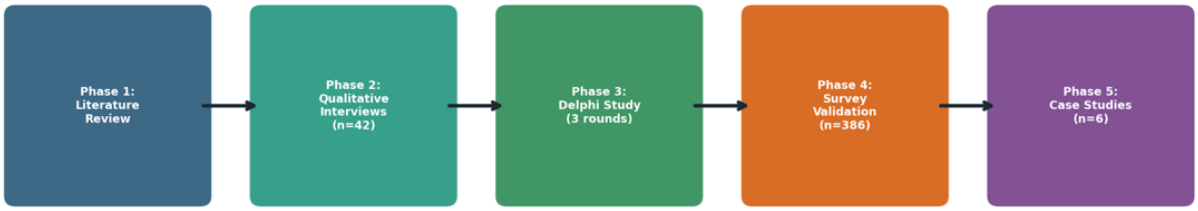

Figure 2. Sequential Mixed-Methods Research Design for Framework Development and Validation.

4.3 Psychometric Validation Results

The psychometric properties of the EDAF instrument are shown in Table 3. The hypothesized ten-factor structure was confirmed by exploratory factor analysis with all items loading on the intended factors (factor loadings > 0.60) and all cross-loadings < 0.30. Confirmatory factor analysis demonstrated acceptable model fit: chi-square(527) = 892.4, $p < .001$; CFI = 0.94; TLI = 0.93; RMSEA = 0.058 (90% CI: 0.052-0.064); SRMR = 0.054. Cronbach's alpha ranged between 0.84 and 0.93 and the McDonald's omega ranged between 0.85 and 0.94 for the internal consistency of all the dimensions. The overall instrument had excellent reliability (alpha = 0.91).

Table 3. Psychometric Properties of the EDAF Instrument

Dimension	Items	Alpha	Omega	AVE	CR	Mean (SD)

Strategic Align.	8	0.88	0.89	0.61	0.91	5.8 (1.9)
Governance	9	0.91	0.92	0.64	0.93	5.4 (2.1)
Workflow Integ.	8	0.86	0.87	0.58	0.89	5.9 (1.8)
Research Ops	8	0.87	0.88	0.59	0.90	4.9 (2.2)
Design System	9	0.90	0.91	0.62	0.92	6.2 (2.0)
Accessibility	8	0.85	0.86	0.57	0.88	5.1 (2.3)
Knowledge Mgmt	7	0.84	0.85	0.56	0.87	5.3 (2.0)
Collaboration	8	0.89	0.90	0.60	0.91	5.7 (1.9)
Measurement	8	0.86	0.87	0.58	0.89	4.7 (2.1)
AI Adoption	7	0.93	0.94	0.68	0.95	3.8 (2.4)

Figure 3. Five-Level DesignOps Maturity Model with Descriptive Indicators for Each Level.

The significant correlations between EDAF composite scores and other well-known UX maturity measures ($r = 0.72$, $p < .001$ for UXPM scale; $r = 0.68$, $p < .001$ for Design Maturity Index) demonstrated convergent validity. The discriminant validity was supported by the average variance extracted (AVE) values being above 0.50 for all, and the square root of the AVEs were higher than the inter-factor correlations for all the pairs of dimensions. Measurement invariance testing showed that the framework is applicable across organization size categories (small <500, medium 500-5000, large 5000+), with configural and metric invariance across the categories.

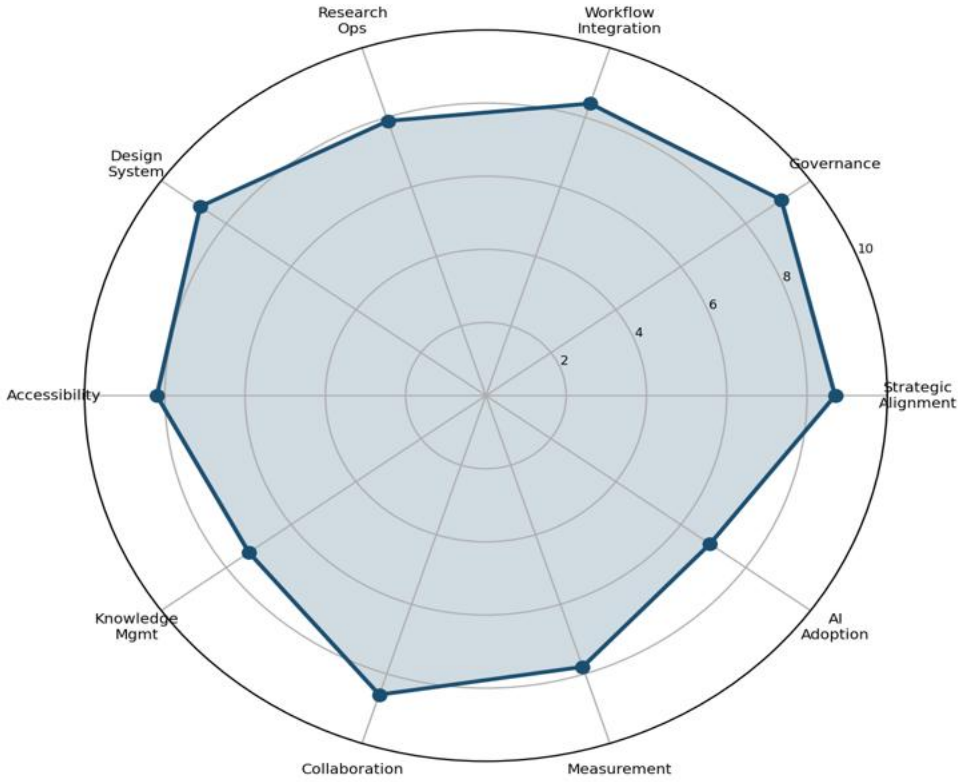

Figure 4. Relative Importance Weights for Ten Assessment Dimensions Derived from Delphi Study Consensus (Scale 1-10).

4.4 Maturity Profiles and Case Study Results

Table 4 displays the maturity profile of the six case study organisations in terms of scores on each of the ten dimensions. The profiles indicate clear patterns, depending on organizational context, industry and strategic priorities. The technology company (Org A) had the highest overall maturity score with an average score of 9.0 in design system, 8.3 in collaboration, and 5.1 in responsible AI adoption. The financial services organization (Org B) had the highest governance score (8.4) and the highest measurement score (8.1) – both of which are indicative of the regulatory environment – with lower scores in the research operations (5.8) and AI adoption (3.2) areas. The accessibility score was strongest for the healthcare organisation (Org C) which aligned with the requirements of the regulatory bodies in the health sector.

Table 4. Maturity Profiles for Six Case Study Organizations (Scores 1-10)

Dimension	Org A	Org B	Org C	Org D	Org E	Org F
Strategic	8.2	6.5	5.8	4.1	7.1	5.5
Governance	7.9	8.4	6.2	3.5	6.8	5.1
Workflow	8.5	6.2	5.5	6.8	7.4	7.9
Research	7.1	5.8	7.8	3.2	5.2	6.4
Design Sys.	9.0	7.1	5.9	7.5	8.2	6.8
Accessibility	6.8	7.9	8.5	4.2	5.5	5.8
Knowledge	7.5	5.4	6.1	5.8	6.3	8.2

Collaboration	8.3	6.1	5.3	7.2	7.0	8.5
Measurement	7.2	8.1	5.7	3.1	6.5	5.2
AI Adoption	5.1	3.2	2.8	6.4	4.0	3.8
Composite	7.6	6.5	6.0	5.2	6.4	6.1

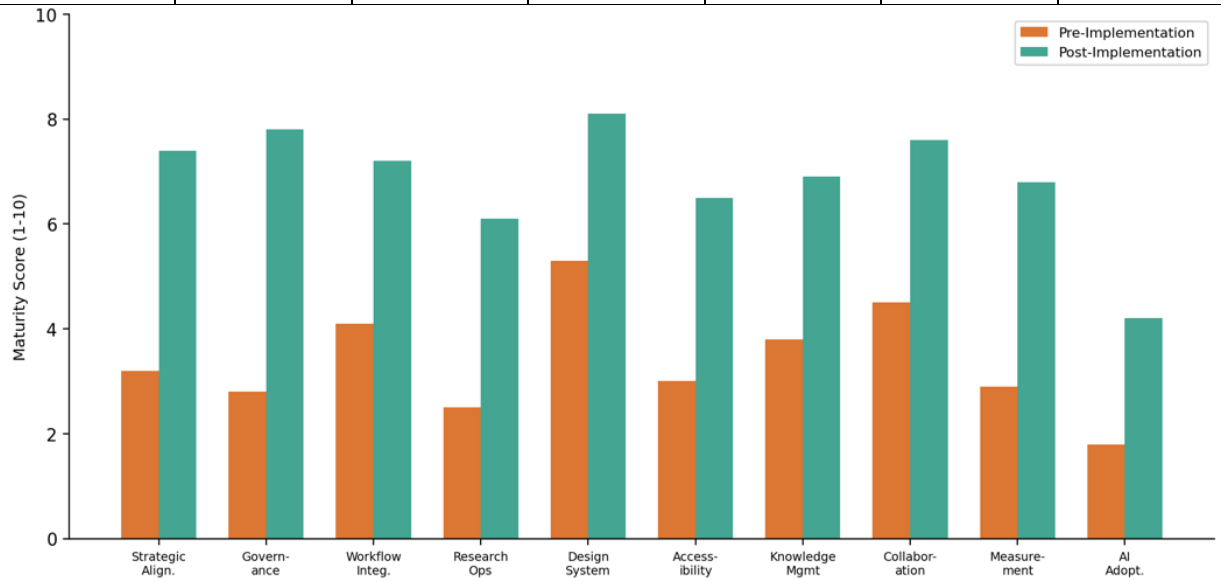

Figure 5. Mean Dimension Scores Pre- and Post-DesignOps Implementation Across Case Study Organizations (n=6).

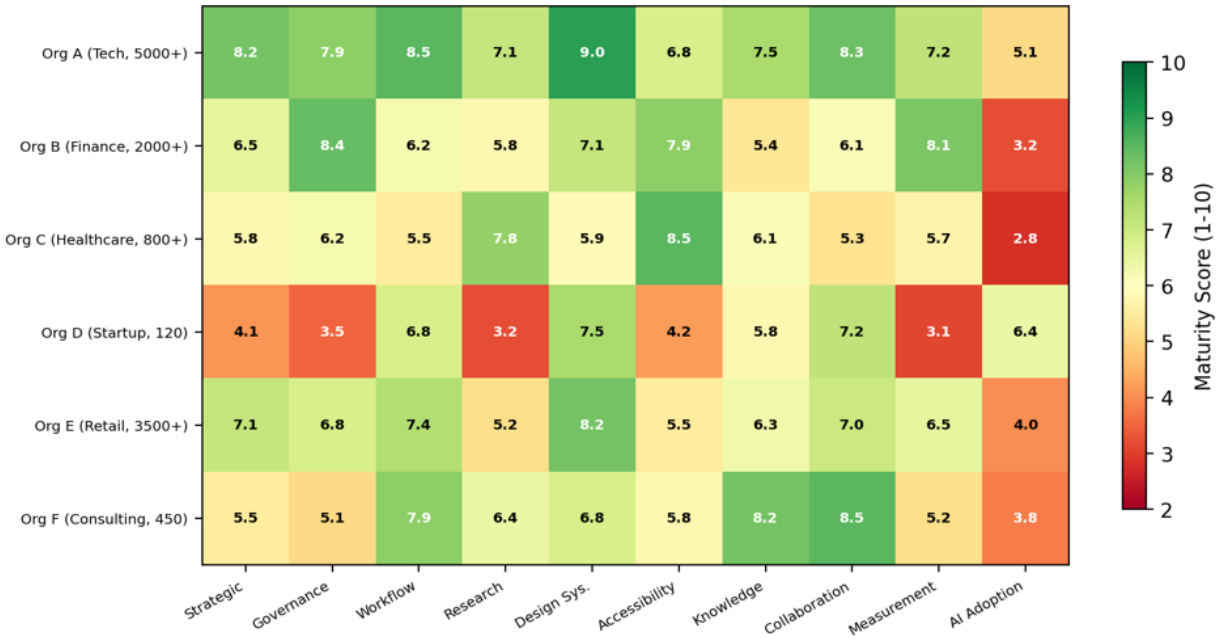

Figure 6. Maturity Profile Heatmap Showing Dimension Scores Across Six Case Study Organizations.

4.5 Relationship Between DesignOps Maturity and Outcomes

Structural equation modeling was used to explore the link between the composite DesignOps maturity and four organizational outcomes: self-reported design quality, product delivery velocity, accessibility compliance, and team satisfaction. The standardized path coefficients are given in Table 5. DesignOps maturity showed significant correlations with all the four outcomes, and had the highest correlation with design quality (beta = 0.68, p < .001) and the lowest correlation with delivery velocity (beta = 0.34, p = .002). The model accounted for 52% of design quality variance, 31% of accessibility compliance variance, 28% of team satisfaction variance and 14% of delivery velocity variance.

Table 5. Structural Equation Model: DesignOps Maturity Predicting Organizational Outcomes

Outcome	Std. Beta	SE	p-value	R-squared
Design Quality	0.68	0.06	<0.001	0.52
Accessibility Compliance	0.56	0.08	<0.001	0.31
Team Satisfaction	0.53	0.07	<0.001	0.28
Delivery Velocity	0.34	0.11	0.002	0.14

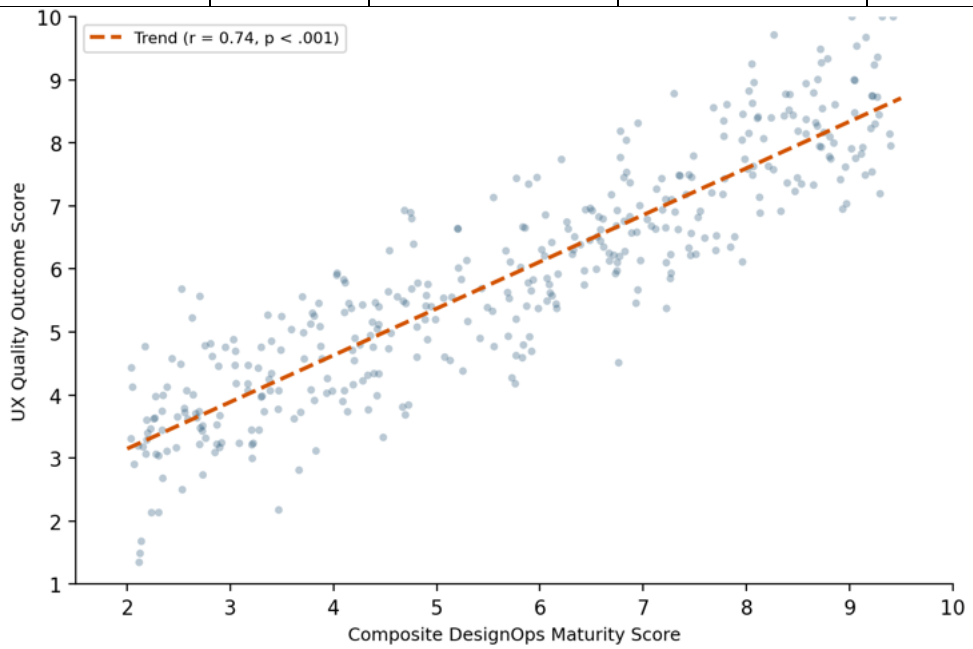

Figure 7. Scatter Plot Showing the Relationship Between Composite DesignOps Maturity and UX Quality Outcomes (Survey Validation Sample, n=386).

4.6 Moderation by Organizational Context

Multi-group analysis was used to assess if the relationship of DesignOps maturity and outcomes differed based on organizational context. The results of moderation are included in Table 6. The relationship between maturity and the outcomes was moderated by organization size for delivery velocity (large organizations, beta = 0.48 vs. 0.22 for design quality) but not for design quality. The industry moderated the relationship for accessibility compliance in such a way that the influence was stronger in the regulated industries (healthcare, financial services: beta = 0.71) than in the less regulated industries (technology, consulting: beta = 0.41). The results indicate that the value of the DesignOps maturity doesn't apply to all contexts, and that the interpretation of the assessments needs to be linked to organizational attributes.

Table 6. Moderation Analysis: Contextual Factors Influencing Maturity-Outcome Relationships

Moderator / Outcome	Group 1 Beta	Group 2 Beta	Delta	p-value
Size: Design Quality	0.71 (Large)	0.64 (Small)	0.07	0.312
Size: Delivery Velocity	0.48 (Large)	0.22 (Small)	0.26	0.018
Industry: Accessibility	0.71 (Regulated)	0.41 (Unregulated)	0.30	0.004
Industry: Team Satisf.	0.58 (Tech)	0.47 (Non-tech)	0.11	0.187

5. Discussion

The Enterprise DesignOps Assessment Framework (EDAF) fills a critical need in the area by delivering a validated multidimensional tool to measure enterprise conditions that support sustainable UX quality. The 5 stages and more than 400 participants led through a range of data collection approaches resulted in a framework with good psychometric properties that was seen to be environmentally valid in a wide range of organizational settings. Results are applicable to research and practice. The ten dimensions of the EDAF represent the wide range of the DesignOps field to go beyond the concept of workflow efficiency and tooling. The dimensions of research operations, accessibility and responsible use of AI acknowledge that design operations need to tackle the whole range of activities that are relevant to the design's quality rather than just the creation of design artefacts. The results of the Delphi study showed that governance and standards stemmed with the highest importance weight, indicating that expert practitioners believe that having clear quality criteria and decision making processes are fundamental aspects of DesignOps effectiveness. This result is consistent with the organizational design theory that focuses on the coordination of the work of a complex organization where work is distributed.

The psychometric validation confirms the EDAF has satisfactory reliability and validity for research and in practice. The internal consistency coefficients are greater than the usual criteria for all dimensions and the confirmatory factor analysis substantiates the hypothesized dimensional structure. The results of convergent validity, which reveal high correlations with known measures of UX maturity, suggest that the EDAF captures similar but different constructs. The ten dimensions are empirically distinguishable despite having conceptual interrelationships, as shown by all AVE values above 0.50, with the discriminant validity results. The score invariance by organizational size categories provides evidence for the possibility of applying the framework in different organizational settings, but the results of the moderation analysis indicate that context factors should be taken into account when interpreting scores. The results from the case studies demonstrate how the EDAF can identify organisation-specific patterns that would not be apparent to more focused ways of assessing. For instance, the score for financial services organization (Org B) was high in the governance and measurement area but relatively low in the research operations and collaboration area, indicating a compliance-driven approach to design that could reduce ability for innovation capacity. With a comparatively high level of AI adoption among startups (Org D) and low measurement and research operations, the profile has an unusual combination of technology orientation but may not have the necessary infrastructure to evaluate the effectiveness of the AI tools. The strengths and the blind spots are captured in these patterns and illustrate the importance of having a multidimensional assessment.

The results of the structural equations modeling provide empirical evidence about the relationship between DesignOps maturity and organizational outcomes. As the finding that DesignOps maturity is 52% of design quality variance shows, the operational infrastructure is relevant. The weaker correlation with delivery velocity (14% of variance) is interesting and could be due to the fact that delivery velocity can depend on a lot of factors other than the design operations, such as engineering practices, market conditions and organizational structure. The results of the

moderation indicate that, at scale, DesignOps maturity offers more operational leverage, as the relationship between maturity and velocity is stronger in larger organizations. The "responsible AI adoption" component is a new one and is worthy of discussion. Given that AI tools are becoming more commonplace in design workflows, the relatively lower importance rating by the Delphi panel could be attributed to the fact that AI is only starting to be adopted in most organizations, uncertainties around best practices, or even a conscious caution to not rush the standardization of AI related processes. The case study of the startup (Org D) highlighted that there were risks identified in having a high level of AI adoption without measurement and governance frameworks to surface risks arising from it. This aspect is likely to be even more critical as AI technology progresses.

There are some caveats to be noted. First, the measurement of organizational outcomes was self-reported, and common method variance and social desirability bias may have affected the validation of the survey. In future studies, objective outcome measures should be used, if possible. Secondly, the cross sectional design of the survey prevents causal claims as data collected at a single point in time cannot definitively establish whether DesignOps maturity improves results. Third, the case studies outlined provided rich contextual information, but the validity for broader use of the framework remains to be determined as it was applied to only six organizations. Fourth, the framework has been formulated based mostly on North American and European practices; it may be necessary to adapt the instrument in other regions due to cultural differences in design operations practices.

6. Conclusion

This paper introduced the Enterprise DesignOps Assessment Framework (EDAF) that is an extensive framework for assessing organizational conditions necessary to support sustainable UX quality. The framework is designed to overcome a variety of limitations and narrow operational metrics by measuring ten dimensions of DesignOps maturity: strategic alignment, governance, workflow integration, research operations, design system adoption, accessibility, knowledge management, cross-functional collaboration, measurement, and responsible adoption of AI. Cultivation of the instrument by literature search, practitioner interviews, Delphi consensus, survey validation with 386 participants and six case studies, resulted in an instrument with strong psychometric properties and ecological validity. This paper has three main contributions. First of all, the EDAF offers an instrument for the assessment which has been validated and can reliably determine the strengths and barriers of the organization's operation in the entire range of DesignOps competencies and pinpoint the potential for improvement. Secondly, the five-level maturity model that goes with the framework gives a developmental perspective, helping organisations to understand where they're at, where they should be and what they should be doing to get there. Third, the empirical link between DesignOps maturity and organizational outcomes (design quality, accessibility compliance, team satisfaction, and delivery velocity) offers a business case for investing in DesignOps capabilities that has been lacking from the literature.

The practitioner can use the EDAF as a diagnostic instrument to guide strategic planning, resource allocation and capability building. The multi-dimensional nature of the framework gives organizations a chance to not spend too much time on a new capability they are seeing, like design systems, but not focusing enough on a less visible capability, like knowledge management or research operations. The contextual moderation results are used to help organizations understand their scores in the context of their situation and the maturity model is a roadmap for how to move forward. The EDAF can be employed to understand the mechanisms by which design operations impact organizational outcomes, to compare DesignOps practice in different industries and cultures, and to assess the success of DesignOps interventions for researchers. The framework's dimensional structure allows for in-depth exploration of which parts of DesignOps are more important for which results, shifting away from the question of whether DesignOps matters, and onto the question of how certain aspects of DesignOps are more relevant to certain results.

This work should be expanded on in the following ways: To make causal connections between DesignOps maturity improvements and organizational outcomes, there is a need for longitudinal studies. The structure and weights of the framework need to be cross-culturally validated to establish if the structure and weights are robust across national and organizational cultures. The validity of the maturity-outcome relationships would be increased if

objective outcome measures (actual accessibility audit results, product quality measures, or employee turnover measures) were provided. Lastly, studies on the implications of EDAF assessments for interventions, in terms of action of organizations on assessment results and the most effective interventions on the dimensions would improve the usefulness of the framework in practice.

Finally, with design being increasingly seen as a strategic capability that is central to the performance of the organization, the operational infrastructure required to support design effectiveness should be treated with the same rigour and attention that is given to other critical capabilities of the organization. The Enterprise DesignOps Assessment Framework serves as a starting point for that rigor, as a validated, complete and contextually relevant means to understand and enhance conditions for value delivery at scale through design.

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