

A study of Integrated research process

Between design and social science research

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Abstract

For creative ideas and problem-solving, various methodologies are used in the field of design and social sciences. Design methodology includes a variety of ways to come to a solution prototype through qualitative surveys of users. Meanwhile, in the field of social sciences, a quantitative and larger scope user survey is used to verify suggested solutions or analyze the issues of social phenomena. In order to complete the problem-solving process through planning and analysis, there is a need to combine these two methodologies. This study compiled usable methodologies by analyzing theses in the field of design and social sciences and establishing meta data in order to develop and suggest a more integrated methodology. By taking into account the stages and methods where each methodology has strength, a five stage research methodology is suggested, PAIRS, that consists of Phenomena-Analysis-Ideation-Review-Supply. In the stages of Phenomena, Ideation and Supply, design methodology can be used effectively, while in the stages of Analysis and Review, methodologies of social sciences with more analytical components can be used. This is expected to allow the use of various methodologies depending on the purpose and stage in the research and development of products and services in both design and social sciences. By doing so, it is expected that it will contribute to the conclusion of insights and suggestions of innovative solutions.

Keywords: Integrated Research Process, Design Methodology, Social Sciences Methodology, PAIRS

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1. Introduction

1.1 Purpose of the research

In the area of design and social science, many different methods to increase creativity are being researched and are used in many ways for service researches. These methods are creating social revolution in many companies and labs and its importance is being recognized from its results.

The methods are developing by trends and the boundary of the researches that apply these changing methods are expanding. It is defending the fact that the importance of using methods that are out of the boundary is expanding.

It is said that the importance about integrated methodologies which was re-interpreted and re-created grow with the introduction of methodologies in other areas. New methodologies have been developed and utilized consistently but there are no platform which classifies them systemically. In terms of utilization and effectiveness of methodologies, they are applied in diverse areas but there are only few of in-depth researches.

Therefore, this research has the follow purposes.

First, design and social science methodologies are structuralized with purpose, utilization, and meta-data. It was prepared as per cause and type for user to use appropriate methodologies.

Second, we understand and analysis the strength and weaknesses of the methods between design and social science; categorizing and systemizing them, helping to develop integrated methodologies.

1.2 Research Process

1) Design, social science methodologies collection

The methodologies used in advertisement, media, management, cognitive psychology, cognitive engineering, HCI, human psychology related to design, and social science are collected through online and off-line articles, journals, and books.

2) Design, social science methodologies integration and classification.

Classify, systemization and arrangement of design and social science area as a similar category. Understand the features of methodologies in both areas and analyze strength and weaknesses by re-organizing analyzed data and constructing

meta-data based on utilization.

3) Suggest integrated process

Analyze the methodologies, which are used regularly in internal and external dissertation used in companies. By integrating and analyzing methodologies of design and social science, develop and propose the process that emphasize phased strength of each process.

2. Previous works

2.1 Structuring meta-data

Generally, meta-data called “the data about data” is designed as the tool to describe digital resources effectively. This term was used to be made by computer engineers and the data-base area, but the fundamental concept about Meta data has been in the library after the first-attempt to organize and describe the information.

With the stream of time, as the information type which is available to use online diversifies, meta-data schema form is made to describe and manage digital information-resources by defining a series of factors.

- (1) Meta data has to inform and express resources. This is usually described by the characteristics of the information resources.
- (2) Meta data has to provide specific information resources or contents.
- (3) Meta data should be able to handle all types of information resources.
- (4) Meta data should be the structured to handle machine-understandable information .

In this research, by collecting and categorizing the methodologies of researches related to new-media through the journals, construct the close relations of each category

Classify the meta-data of design and social science & management methodologies to make the correlation

Re-organize the Classified meta-data, to make it easier for the users, through cord-sorting that makes it systemical and definite in structure in storing the form which can be processed easily.

2.2 Design methodology

1) Service design methodology

Service design methodology starts from approaching the problem. The deduced problem on the base of analysis of surveys can write down scenarios in the beginning of the design-process. With priority given to the scenario drawn up, we can approach the point of contact to solving problems by using the blue-print service and customer journey map or persona, etc. As the service design builds up with experience, the key-value of design service does not search the cause of the superficial activity and mind, but draws the factors of the problem through experience in living an environment of space like the blue-print service and customer journey map or persona as service design methodology.

Also, the factor of experience must go through the process of changing the knowledge and analyzing of results of the direct and indirect experience. This composes the reappearance of

the knowledge of participants.

This model have 4 steps as below;

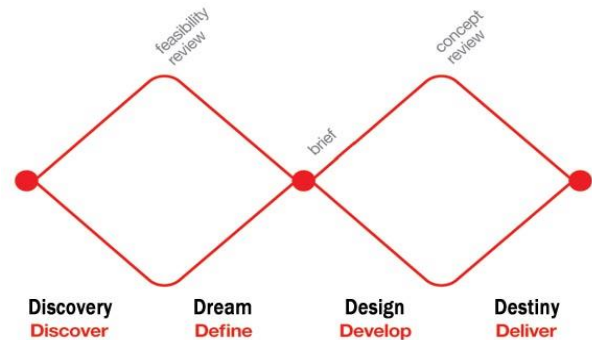


Figure 1 Service design methodology

The stage 'Discover' involves observation & collection. The goal of this stage is to select the research theme and to understand the present state and problem through the user’s observation.

The stage 'Define' is the process of finding the problem. The goal of this stage is to find the state of the problem and to draw the design with data, which are explained from previous stage.

The stage 'Develop' consists of the development of product and service. The goal of this stage is developing product/service concept through the concretion of idea.

The stage 'Deliver' is the final procedure. The goal of this stage is to announce the final decision about product and service, sharing mutually.

2) IDEO

Because of IDEO Company uses a process which is very famous for innovation and integration, we selected one of benchmarking case. The process of IDEO is as in the

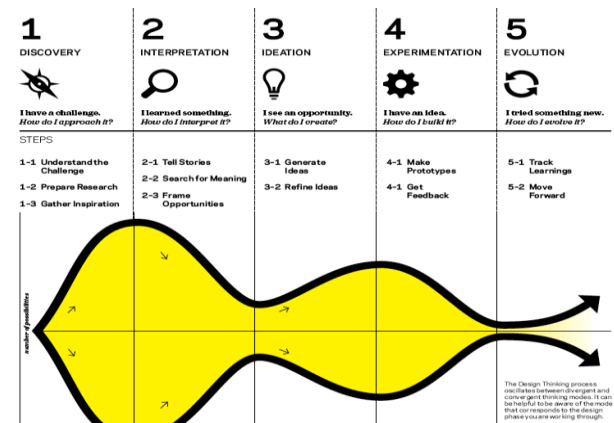


Figure 2 The five phases of the design process

following;

- (1) Inspiration: The stage of people’s idea.
- (2) Concepting: The stage of mapping the best idea which would get sympathy of many people among the ideas.
- (3) Refinement: stage of designing the idea concretely
- (4) Evaluation: Stage of evaluation of users

(5) Winner Announced: Stage of selecting the final conception.

The features of IDEO methodology is the following.

First, the collaboration of participants who have diverse background each decides time frame in the dedicated space. Second, through the observation, research about the users. Third. Through the synthesis, find the opportunity.

Since the process of diverse participant's collaboration involves, not simply designers, but also people of other areas, it has steps and methods suitable for both people. It is also researched as the form of creative work shop.

2.3 Social science methodology

Grasping the problem	Analysis of problem	Verification of secondary data
-Identifying Problem -Setting the problem of research -Setting theory	-Setting the Variable -Collecting data -Analyzing data	-Analyzing factors -Correlation of theory

Figure 1 Social science methodology

The social scientific methodology consists of the stage ' grasping the problem', 'analysis of problem', verification of secondary data'.

In the stage ' grasping the problem', first, observe the issue and phenomenon. Second, question and doubt. Third, set up the research problem and set the hypothesis after assorting diverse thought about problem. Research method, one of the process in social science, is the key role. It finds out and sets the independent, dependent, and experimental variable from the hypothesis in way of social science research.

The way of social science research is composed of two courses, 'collecting data', and 'analyzing data.'

In the stage 'collecting data', researchers make the research design suited for the theme of research and set up the object of the study. Finally, they collect the information with priority given to them.

In the stage 'analyzing data', researchers analyze the collected data with diverse statistics programs.

The ways to collecting data consist of ways to investigate and way to analyze called statistics. There is the step of verification for understanding the reliability, validity, and correlation. Through this, we have significance for processing objective and factual researches.

2.4 Business Model Development Process

According to [8] , there are 4 procedures, which are 'business model plan', 'business model design', 'business model realization', and 'business model management.' In the stage 'plan'. we analyze the environment, requirement, business validity, and deducibility of the promising BM.

In the stage 'design', there are customer, business, and partner scenarios. In the stage 'realization', there are value mapping, process mapping, and platform mapping. Finally, in the stage 'management', there are profit administration, capability administration, and risk administration.

BM Plan	BM Design	BM Implementation	BM Operating
-Analyzing environment -Analyzing requirement -Analyzing business validity -Deduce the promising BM	-Customer scenarios -Business scenarios -Partner scenarios	- Value mapping - Process mapping - Platform mapping	- Revenue management - Competence management - Risk management

Figure 2. 4 steps of procedures and activities for designing business model

3. Analysis of methodology with meta-data

3.1 Categorization of meta-data

The collected data is divided largely by methodology and it is classified based on the features of methodology, which is used in each methodology centrally. We prepare the guide by target and media. We classify the methodologies by the features of technique to facilitate approach of course and application.

Purpose and example of each classification are tabled as follows.

Table 1 Classification Meta-data by purpose

Metadata	Purpose / Examples
Methodology	The concrete explanation of the methodologies and classification of subordinate methods for organizing archiving <i>Service Design process / Interaction Design / User Experience Design / Emotional Design</i>
Method	The concrete explanation of the methodologies and classification of subordinate methods for organizing archiving <i>Touch Point Matrix / Mind Mapping / Persona / Interview / Blue Print / Affinity Diagram</i>
Design Process	The easy approach on method at each stage and the comparison of similar method 1) <i>Discover: Related to surveying for collecting information.</i> 2) <i>Define: Analysis of Information, definition of problem</i> 3) <i>Develop: Developing an idea, a way to draw the service conception.</i> 4) <i>Deliver: Way to develop and practice service proto-type.</i>
Target	We understand suitable Methodology Classified by target of research and help to applicate <i>Environment, company, person</i>
Qualitative/ Quantitative	By the features of the quantitative, qualitative surveys, we can analogy the procedures of each methodology which draw a conclusion. We also understand relationship with the subject
Media	We make the target of research classified by the media, we can select the suitable methodology as per the kind of media. <i>Cloud system, internet, IP TV, mobile, online, Sns, smart phone, smart media</i>
Standard of analysis	It helps to discern the suitable method depending on the type of research <i>Activity, attitude</i>
Creativity	It shows the method is involved in creative design area, another area or original area. <i>Innovation, application, tradition</i>
Aptitude	It is classified by the chief aim.; beginning exploration, concept development, experimentation, assessment <i>Exploration, production, assessment</i>

3.2 Analysis of meta-data

1) Results of analyze of design methodologies

In the area of design, we analyze literatures and websites which have keywords of design methods or process; domestic 150, foreign 150, and company ; domestic 10, foreign 10

Table 2 Results of analyze of design methodologies

	Domestic	International
Methodology	Emotional design process, emotional evaluation / context design process/ Interactive design process/ Interaction design process/ Service design process/ User participation design/ User experience design/ PSS design process/ IDEO design process/ Value design process Product service integration design process Business model developing process	Design cognition / UX Design Process / Design Theory / Information Seeking / Observation / Interaction Design / Service Design Process / Service Task Analysis / Toolkit / Workshop / Digital Humanities/ Modeling The Design Dialogue Framework /design process (first-user-study-then-design) / Collaborative Design / Card-based toolkit / Activity Theory
Methods	Brain storming/ emotional area image map/ observation/ interview/ Modeling/ persona/ storyboard/ proto-typing/ scenario/ focus group inter -view/ mental-model / creative workshop/ context mapping/ emotional experience exploring drama/ brand touch point wheel/heuristic evaluation/ value design space/ design function/ target segment analysis/ User Model /	Epistemology / Data Analysis / Observations / Discussion / scenario based design approach / Action function Diagram / Affordance Evaluation Method / Ethnomethodology and Conversation Analysis / Ethnography / Mobile ethnography / Data Collecting & Categorizing Shadowing / Mapping, Interviews / User Journals, or Observation
Target	- Environment: 28% - Company: 52% - User/Customer: 20%	-Company: 56%
	- Quantitative: 30% - Qualitative: 70%	- Quantitative: 40% - Qualitative: 60%

The analysis of the meta-data related to design-methodology is as in the following.

Table 3 Meta-data related to design-methodology

Domestic Researches	<ul style="list-style-type: none"> Using on diverse methodologies related to Creating idea, developing product, delivering Putting on diverse methodologies which can understand specific and diverse user's need. Putting on methodologies which is useful for expanding idea with the coincidental and dramatic features in design methodology.
International Researches	<ul style="list-style-type: none"> Through the co-work, propose the methodology which can share variably by making participation higher. Through the visualization, propose the efficient way of tool which can analysis the problem in the general viewpoint. Propose the method of mainly relationship analysis, which include all people concerned
Domestic Enterprises	<ul style="list-style-type: none"> Understanding the example of the process and methods used in practical business. Showing the strength in giving the efficient service- experience through practical and specific analysis. Availability to analyze developed-examples which applicate diverse methodologies in a new way.
International Enterprises	<ul style="list-style-type: none"> Processing new and lasting trials through developing creative methodologies Keeping the unique principle and methodology of each company. Through the co-worker, enforce the methodology which can make the creativities.

2) Results of analyze of social science methodology

The analysis of the meta-data related to design-methodology is as in the following. In social science area, we analyze the researches, domestic 150, foreign 150,

Table 4 Results of analyze of social science methodology

	Domestic	International
Methodology	Interview Survey Experiment Content analysis Case study Literature study Participant – observation, Accident research methodology,	Interview Survey Experiment Content analysis Case study Literature study Participant – observation,
Method	APT laddering, pilot test, snowball sampling, Group simulator, Idea simulator Direct writing - survey, off line survey, on-line survey, mobile - survey, invitation - survey, chatting interview, focus group interview, big data analysis, News letter analysis, line network measurement, example	Discourse Analysis, Virtual ethnography. The Transcultural Approach, Experimental simulation, Self- report measures, Online survey, Mail survey, Group administered questionnaire, Focus group interview,

	research, term study, eye - tracker, conjoint – analysis MMPI, drawing a person test, ego-value examination,	Qualitative content analysis,
Target	-Environment: 26.45% -Company: 40% -User/Customer: 33.54%	-Environment: 37.50% -Company: 31.25% -User/Customer: 31.25%
	- Quantitative: 88.38% - Qualitative: 5.16% - quan/ qual: 9.67%	- Quantitative: 81.25% - Qualitative: 6.25% - Quan/qual: 12.5%

The analysis of the meta-data related to social science-methodology is as in the following.

Table 5 Meta-data related to social science-methodology

Domestic	<ul style="list-style-type: none"> • Even if the area of research is different, the methods are same • We can find the methodology for collecting quantitative data is the representative • Rather than environment analysis, the researches about the technique of company, person or person as the users are the most • We can find the methodologies which are borrowed from other areas. E.g) Delphi, q methodologies e.t.c
International	<ul style="list-style-type: none"> • Use the methodologies centered on research • For collecting quantitative data, methodologies are used mostly. • Use the methodologies which analyze the features and information of users.

4. Propose the integrated process

4.1 Analysis and integration of the existing process

We collect the data from each process. We also visualize the explanation and collection of the information on the sequence of process. We analyze the point of contact and long distance. We visualize and analyze IDEO, which is the representative of company, service design process, which is most used process in social science and business model process in management.

The visualized picture is in the following.

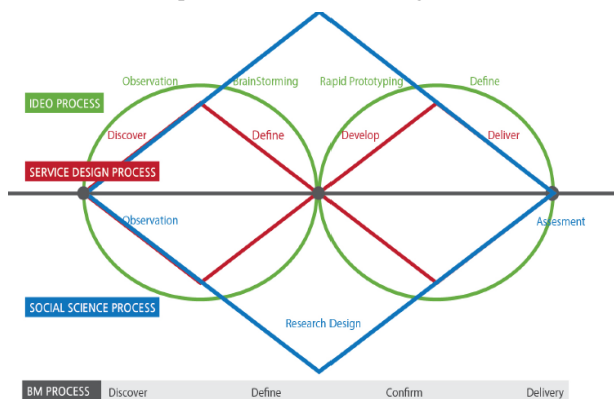


Figure 5 Visualizing the stage of process

It is verified that the result of visualizing the stage of

process, there are 5 points of contact or long distance.

After analyzing the features of the stage, the first and last points are formed as the point of 4 contacts. All processes have the same repetition of expansion and collection.

Based on the visualized data, there are 5 stages and we can show that each strength is in different space by the process of each area.

Especially, we analyze the service design and the features of social science, select the concept suitable for developing integrated process, and propose the diverse in an efficient way according to the purpose of user.



Figure 6 Affinity Diagram for concept

4.2 PAIRS PROCESS

We visualize the process of each stage, analyze the feature, strength and weak points of design and social science. There are definite difference in purposes of each field; in the design methodologies, most features are centralized on intangible data which are produced by user's experiences, emotions, and needs. But in social science methodologies, the features are centralized only on objective verification of data.

In design methods, the strengths are the release of diversity ideas throughout the design research and prototype technologies. More user related output can be approached. However, the standard of second materials by design research and methodology, is ambiguous, not quantitative. That is why in design field, there is a deficit of digitalization of the objective researches. In the social science and management, there are professional objective.

After identifying each process' strength and weaknesses to each stage properly, strong points are emphasized and weak points are complemented. And finally new integrated process are suggested by recombination of the existing processes. To accomplish this process, design service process is used, and based on this structure we are providing a new integrated process which is able to define the problem clearly with providing solid data. I is also able to provide innovative alternative suggestion with objective evaluations.

The step is divided into five parts as the following attribute-centric. The first step in the process is discovering the problem, and the second is identifying the specific problem definition and process of organizing. The third step is to approach the solution for the problem in the study and fourth is to evaluate credibility and validity against a high check. Finally, output is delivered to users as a practical step.

By focusing on these, attributes fit into each steps of the emitting and ideas brainstorming, using most appropriate concept and definition for each step. As a result, integration between design and social sciences is the best in intentions, exposed side-by-side. “P A I R S” the name of the process. The goal for each of the stages and are as follows:

The “PAIRS” “process whole 5 definite steps as below.

Table 6 5 steps of PAIRS process

Phenomena	Through desk research and observation of users/environment, collecting problems and watching phenomena. - Fact finding - Diagnosis status - Understanding stakeholders/ environment
Analysis	Based on collecting data, understand the key problem and define the people concerned. - Redefine the problem - Arrange the need - Analysis relationships between data
Ideation	Through the actualization, developing solution, business model, service. - Explore the latent problems. - Actualization key ideas by prototyping
Review	Through Variable test and survey in social science, we analyze and evaluate the suggested idea - Improvement with modelling verification, assessment
Supply	Through visualization and production of concept, scenario, make the product of the project - Disambiguation of product - Confirmation of the accord of plan, service design and development

Table 7 Concept of PAIRS process

Identity	<ul style="list-style-type: none"> As the key information and method are suggested, users can select & use them to their needs at each stage. Based on definite verifications, we can use properly when we need service-proposal.
Difference	<ul style="list-style-type: none"> We inject the 4 stage process of design and propose methodologies which can put objective data at the same time. Through the definite analysis & verification, We check the status-quo, understand usability and do understand, improvement usefully.
Expandability	<ul style="list-style-type: none"> Availability to apply the process in the diverse area With the combination of lines methods, we can create new integrated processes.

We arrange each method we think is the strength of design & social science methodology to each stage properly in the PAIRS process. Pairs process is the recombination of the existing processes.

In the stage ‘PHENOMENA’, ‘IDEATION’, and ‘SUPPLY’, there are methods which originate from design area as the strength. In the stage ‘ANALYSIS’ and ‘REVIEW’ there are method which have the strength of analysis.

We supplement the weaknesses in both area and propose this complementary process.

5. Conclusion

This research aims to suggest an integrated study/research process between design and social science and our research process is as below;

First we made the data base by searching, classifying and systemizing methodologies from the design and social science research field. Through diverse literature materials, we collect and systemize the methodologies and categorize them by source, concept, stage, target, and department of application. We help the usability and availability of method & methodology.

Second, we apprehend the features of methodology in design & social science and propose the guide-line which was systematized to use properly as per purpose & stage. In the area of design & social science, we borrow the methodology from diverse area depending on purpose, company, and environment for variable research & development. And we help to integrate methodologies among another.

Third, we draw the conception of archiving platform suitable for user and design the creative platform. So we give user experience of the satisfactory integrated archiving.

First, through the systematization of design & social scientific

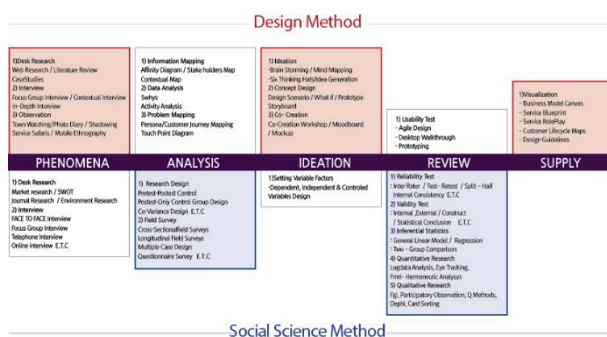


Figure 3 PAIRS process figure

The main concept of this new “PAIRS” process is as in the following.

methodology, we can separate and use the stage depending on the purpose of research and the concrete needs of users. So we applicate it fast and systemically.

Second, we borrow design & social science methodology from company & society. Based on methodologies of both area, We deduce the new insight and help innovative plan & development

Third, through the archiving platform for user, consistently we can collect and categorize data about the design-methodology. With the methodologies from platform, we can make methodology suit for lectures about new-media and will construct the innovative KGIT integrated methodology.

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