東京工業大学工学院機械系　修士課程 2 年

林　寛隆

留学報告書

1.報告事項

1.1 研究内容

大学名　　：Imperial College London

所属　　：Dyson school

指導教員　：Weston Baxter

研究内容　：Digital Psychological Ownership

IROP に参加するにあたり，Dyson school の Weston 教授の元，研究を行いました．

研究内容としては，Human-Computer Interaction の分野の一つである『デジタルに対する心理的所有感』に関する研究を行いました．この研究は，図 1 のように，フレームワークを中心として進めていきました．まず，プロジェクトを開始する前に，『心理的所有感』についての理解を深めるため，いくつかの参考文献を読み，心理的所有感についての理解を深めました．

次に，フレームワークの具体的な構築に取りかかりました．このフレームワークは，ユーザーがデジタル環境内でどのように心理的所有感を感じるかを理解し，その感覚がユーザーの行動や感情にどのように影響を与えるかを分析することを目的としています．この分析には，定性的および定量的な手法を併用し，ユーザーインタビューやアンケート調査を実施しました．表 1 に実際にインタビューに参加していただいた人たちのサマリーを載せています．また、図 2 に示すように，特定のデジタルツールやサービスを使用した際の心理的所有感を測定し，その結果をフレームワークに反映させました．

研究の結果，ユーザーがデジタルデータやサービスに対して強い心理的所有感を持つ場合，利用頻度が増加し，また，他の競合サービスに対するロイヤリティも向上することが確認されました．これにより，心理的所有感がユーザーエンゲージメントにおいて重要な役割を果たすことが示されました．

最後に，このフレームワークをさらに発展させるために，異なるデジタルコンテキストや文化圏での検証を行う必要があると考えています．この研究は、将来的にデジタルプロダクトデザインやサービス提供の方針に対して新たなインサイトを提供する可能

東京工業大学工学院機械系　修士課程 2 年

林　寛隆

性があります.

今後の予定としては，教授と博士の方と協働で，論文の投稿を行う予定です.

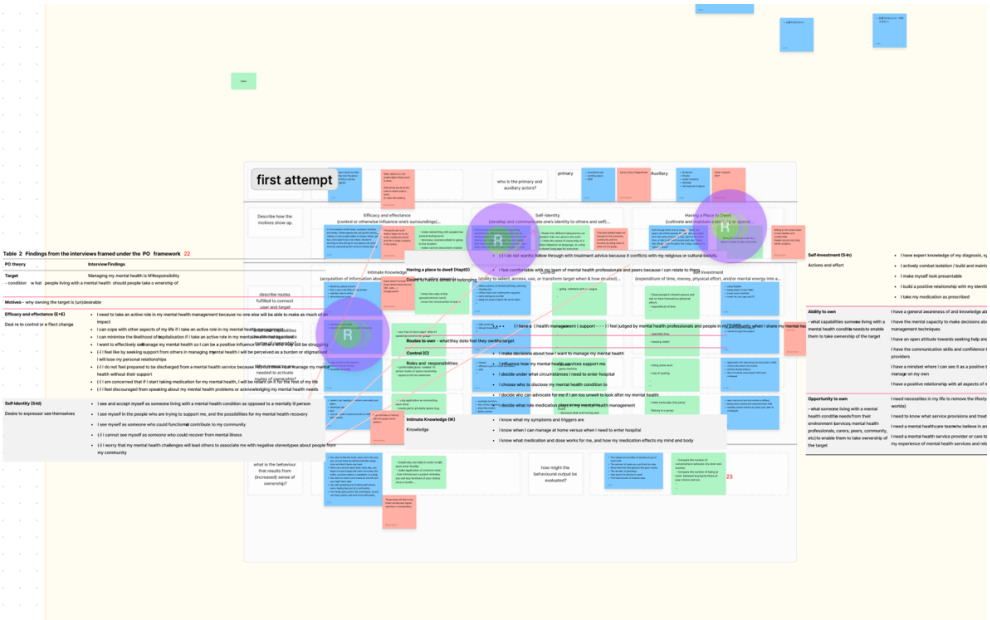


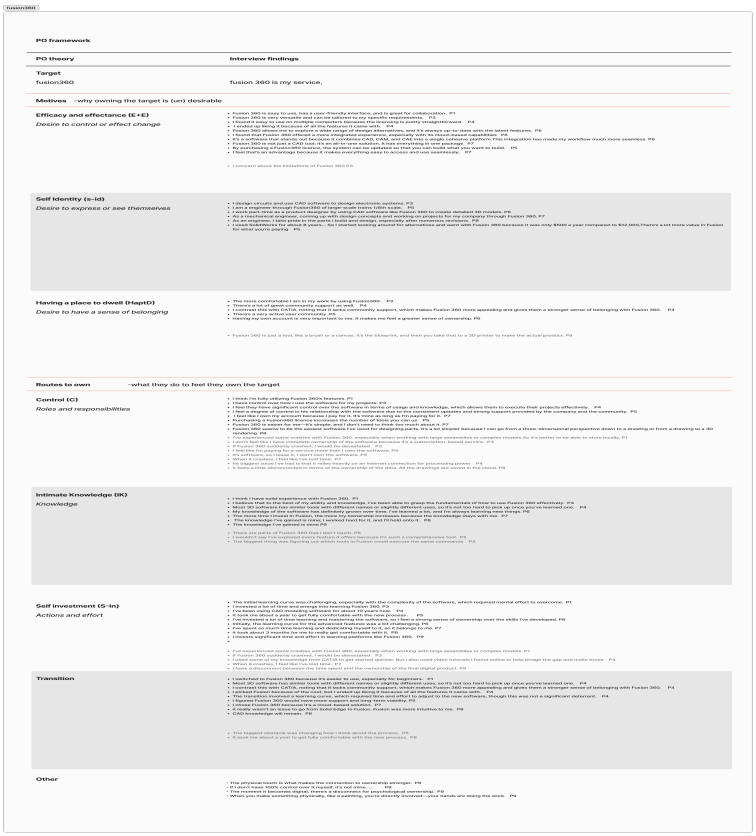
図 1.フレームワーク(イメージ)

表 1. インタビュー参加者のサマリー

Fusion360					
Participant	Gender	Age	Nationality	Education	type of occupation
P1	Male	33	USA	Some College	Civil Engineering
P2	Male	25	Nigeria	Some College	Software Developer
P3	Male	35	USA	Postgraduate degree	Financial Analyst
P4	Male	33	USA	Undergraduate degree	Industrial Designerr
P5	Male	50	USA	Undergraduate degree	Business Analyst
P6	Male	33	USA	Undergraduate degree	Forklift Driver
P7	Male	46	USA	Some College	Mechanical Engineer
P8	Male	35	USA	Postgraduate degree	Manufacturing Engineer
P9	Male	42	USA	Some College	Cinematographer
Google Calendar					
P10	Female	44	USA	Undergraduate degree	Teacher
P11	Male	30	USA	Undergraduate degree	Chief Executive Officer
P12	Female	26	USA	Undergraduate degree	Digital Marketing Manager
P13	Female	39	USA	Postgraduate degree	Administrative Assistant
P14	Male	44	USA	Undergraduate degree	Administrator
P15	Female	67	USA	Undergraduate degree	Project Manager
P16	Female	58	USA	Undergraduate degree	Operations Assistant
P17	Female	28	USA	Undergraduate degree	Photographer
P18	Male	39	USA	Postgraduate degree	Physician
Linkedin					
P19	Female	35	USA	Undergraduate degree	Customer Service Agent
P20	Female	45	USA	Some College	Educator
P21	Female	37	UK	Undergraduate degree	Recruiting Manager
P22	Female	24	India	Undergraduate degree	Teacher
P23	Female	39	USA	Postgraduate degree	Administrative Assistant
P24	Female	42	USA	Postgraduate degree	IT Technician
P25	Female	37	USA	Undergraduate degree	Owner
P26	Female	39	USA	Undergraduate degree	Teacher

東京工業大学工学院機械系　修士課程２年

林　寛隆



fusion360

PO framework

PO theory	Interview findings
Target fusion360	fusion 360 is my service,
Motives -why owning the target is (un) desirable	
Efficacy and effectance (E+E) *Desire to control or effect change*	• Fusion 360 is easy to use, has a user-friendly interface, and is great for collaboration. P1 • Fusion 360 is very versatile and can be tailored to my specific requirements. P3 • I found it easy to use on multiple computers because the licensing is pretty straightforward. P4 • Fusion 360 allows me to explore a wide range of design alternatives, and it's always up-to-date with the latest features. P6 • Fusion 360 allows me to explore a wide range of design alternatives, and it's always up-to-date with the latest features. P6 • It's software that stands out because it combines CAD, CAM, and CAE into a single cohesive platform.This integration has made my workflow much more seamless. P8 • Fusion 360 is easy to use, has a user-friendly interface, and is great for collaboration. P1 • By purchasing a Fusion360 license, the system can be updated so that you can build what you want to build. P5 • I feel that's an advantage because it makes everything easy to access and use seamlessly. P7 • I concern about the limitations of Fusion 360 P3
Self identity (s-id) *Desire to express or see themselves*	• I design circuits and use CAD software to design electronic systems. P3 • I am a engineer through Fusion360 of large-scale trains 1/8th scale. P5 • I use Fusion 360 to create 3D models of my ideas, and I use Blender 3D to create detailed 3D models. P6 • As a mechanical engineer, coming up with design concepts and working on projects for my company through Fusion 360. P7 • As an engineer, I take pride in the parts I build and design, especially after numerous revisions. P8 • Fusion 360 costs $500 a year for a user... So I started looking around for alternatives and even with Fusion 360 because it was only $500 a year compared to $12,000,There's a lot more value in Fusion for what you're paying. P9
Having a place to dwell (HaptD) *Desire to have a sense of belonging*	• The more comfortable I am in my work by using Fusion360. P3 • There's a lot of great community support as well. P4 • Fusion 360 is great for collaboration, and the community support, which makes Fusion 360 more appealing and gives them a stronger sense of belonging with Fusion 360. P4 • There's a very active user community P5 • Having my own account is very important to me. It makes me feel a greater sense of ownership. P6 • Fusion 360 is just a tool, like a brush or a canvas. It's the blueprint, and then you take that to a 3D printer to make the actual product. P9
Routes to own -what they do to feel they own the target	
Control (C) *Roles and responsibilities*	• I think I'm fully utilizing Fusion 360's features. P1 • I have control over how I use the software for my projects. P3 • I feel I have control over the software as I have the ability to manage usage and knowledge, which allows them to execute their projects effectively. P4 • I feel a degree of control in my relationship with the software due to the consistent updates and strong support provided by the company and the community. P6 • I feel like I own my account because I pay for it. It's mine as long as I'm paying for it. P7 • I feel like I own the software because I have the ability to use it whenever I want. P8 • Fusion 360 is easier for me—it's simple, and I don't need to think too much about it. P7 • I feel the limitations to be the easiest software I've used for designing parts. It's a lot simpler because I can go from a three-dimensional perspective down to a drawing or from a drawing to a 3D rendering. P8 • I feel like I have control over the software because I can easily work with large assemblies or complex models.So it's better to be able to store locally. P1 • I don't feel like I have complete ownership of the software because it's a subscription-based service. P5 • If Fusion 360 suddenly crashed, I would be devastated. P3 • I don't feel like I have complete ownership of the software. P4 • It's software, so I lease it. I don't own the software. P5 • When it crashes, I feel like I've lost time. P7 • I feel limited in control because I rely heavily on an Internet connection for processing power. P2 • It feels a little disconnected in terms of the ownership of the data. All the drawings are saved in the cloud. P6
Intimate Knowledge (IK) *Knowledge*	• I think I have solid experience with Fusion 360. P1 • I believe that to the best of my ability and knowledge, I've been able to grasp the fundamentals of how to use Fusion 360 effectively. P5 • My knowledge of the software has definitely grown over time. I've learned a lot, and I'm always learning new things. P4 • My knowledge of the software has definitely grown over time. I've learned a lot, and I'm always learning new things. P4 • The more time I invest in Fusion, the more my ownership increases because the knowledge stays with me. P7 • I've been using it for a long time, so it's a tool that's hard for it, and it's hard only it. P8 • The knowledge I've gained is wise P9 • There are parts of Fusion 360 that I don't touch. P6 • I wouldn't say I've explored every feature it offers because it's such a comprehensive tool. P5 • The biggest thing was figuring out which tools in Fusion could execute the same commands. P4
Self investment (S-In) *Actions and effort*	• The initial learning curve was challenging, especially with the complexity of the software, which required mental effort to overcome. P1 • I invested a lot of time and energy into learning Fusion 360. P3 • I spent a lot of time learning and dedicating myself to it. P4 • It took me about a year to get fully comfortable with the new process. P5 • I've spent a lot of time learning and dedicating myself to it, so it belongs to me. P7 • Initially, the learning curve for the advanced features was a bit challenging. P8 • I've spent so much time learning and dedicating myself to it, so it belongs to me. P7 • It took me about a year to get fully comfortable with the new process. P9 • I invest significant time and effort in learning platforms like Fusion 360. P8 • I've experienced some crashes with Fusion 360, especially when working with large assemblies or complex models. P1 • If Fusion 360 suddenly crashed, I would be devastated. P3 • Initially, it was challenging to navigate the UI and get started quickly. But I also used video tutorials I found online to help bridge the gap and make those P4 • When it crashes, I feel like I've lost time. P7 • I feel a disconnect between the time spent and the ownership of the final digital product. P9
Transition	• I switched to Fusion 360 because it's easier to use, especially for beginners. P1 • Most 3D software has similar tools with different names or slightly different uses, so it's not too hard to pick up once you've learned one. P4 • I switched to Fusion 360 because it's more user-friendly and has a better interface compared to other software, making it easier to learn and gives them a stronger sense of belonging with Fusion 360. P4 • I picked Fusion because of the cost, but I ended up liking it because of all the features it came with. P4 • The transition involved a learning curve, which required time and effort to adjust to the new software, though this was not a significant deterrent. P4 • I chose Fusion 360 because it's a cloud-based solution, which enhances my mobility. P5 • I chose Fusion 360 because it's a cloud-based solution. P7 • It really wasn't an issue to go from Solid Edge to Fusion. Fusion was more intuitive to me. P8 • CAD knowledge will remain. P8 • The biggest mistake was changing how I think about the process. P5 • It took me about a year to get fully comfortable with the new process. P9
Other	• The physical touch is what makes the connection to ownership stronger. P9 • Fusion 360 is just a tool, like a brush or a canvas. It's the blueprint, and then you take that to a 3D printer to make the actual product. P9 • The moment it becomes digital, there's a disconnect for psychological ownership. P9 • When you make something physically, like a painting, you're directly involved — your hands are doing the work. P9

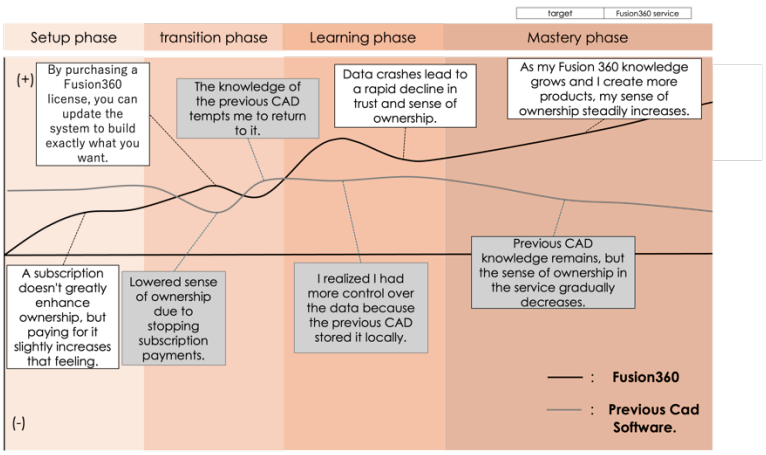


図 2.Fusion360 のサービスに対しての心理的所有感

東京工業大学工学院機械系　修士課程 2 年

林　寛隆

1.2 IROP 学生間での交流

今回，IROP への参加を決めた最大の理由は，このプログラムを通じて学生同士が交流できる機会があったからです．今回は，5 つの大学から学生が各国より集まり，IROP に参加しました．私たちはお互いの研究分野や将来のキャリアについて深く話し合い，それぞれが普段では得られない貴重な情報を共有することができました．

特に，他国から見た日本の文化や研究がどのように評価されているのかを知ることができたことは，非常に有意義でした．また，様々な文化圏の学生たちと触れ合う中で，それぞれの国の文化や知識を吸収する機会が得られ，大変貴重な経験となりました．さらに，ここで築いた人脈は，今後の人生において必ず役立つものと確信しております．また，このような交流を通じて，異なる視点や価値観を学ぶことができたことは，私にとって大きな財産となりました．

写真 1.Imperial College London の様子

東京工業大学工学院機械系　修士課程 2 年

林　寛隆

写真.2. IROP 集合写真

写真 3.研究室のメンバー

東京工業大学工学院機械系　修士課程 2 年

林　寛隆

写真 4.IROP の学生との交流

1.2 イギリスでの生活

2 ヶ月間ロンドンに滞在しました．英語圏での日常生活を送る中で，スピーキング力とリスニング力が確実に向上したと感じています．さらに，ロンドンの美しい街並みを日常的に楽しむことができ，とても色鮮やかな日々を過ごしました．

インペリアル・カレッジの近くには，3 つの大きな博物館があり，すべてを訪れることができました．ヴィクトリア＆アルバート博物館では世界の歴史を学び，ロンドン自然史博物館では生物の歴史や化石に触れ，科学博物館では世界の文明の進化を知ることができました．これらのミュージアムは，日本ではなかなか見ることのできない規模と内容で，非常に刺激的で学びの多い施設でした．

これらの貴重な経験は，人生においてそう多く得られるものではないと思います．このような機会を与えてくださった Tazaki 財団の皆様に，心から感謝申し上げます．

東京工業大学工学院機械系　修士課程２年

林　寛隆

写真 5.ロンドンの街並み

東京工業大学工学院機械系　修士課程 2 年

林　寛隆

写真 6. 博物館

東京工業大学工学院機械系　修士課程 2 年

林　寛隆

謝意

この度は，IROP への参加に際し、Tazaki 財団様より多大なるご支援を賜り，心より感謝申し上げます．貴財団のご支援がなければ、この貴重な留学の機会を得ることはできませんでした．

今回の経験は、私の今後のキャリアを築く上で大変重要な糧となりました．IROP に参加した 5 大学の学生との交流は非常に有意義であり、各大学の情報交換に加えて、将来の進路についてもお互いに意見を交わすことができました．これにより、今後のキャリアに対する視野が大きく広がりました．また、異なる文化や価値観を持つ人々との交流を通じて、自分自身の視野を広げ，新たな発見をすることができました．特に、グローバルな視点で物事を考える力が身についたことは、今回の留学で得た最大の成果の一つと感じております．この経験が将来のキャリアに大いに役立つと確信しております．さらに、IROP を通じて築いた友人関係やネットワークは、今後も続けていきたいと考えております．これらのつながりは、将来的に共同研究やプロジェクトで再び交わる可能性があり、非常に貴重なものだと感じております．今回の留学で得た知識や経験を、今後の学びや仕事に活かし，日本と海外の架け橋となれるよう努めてまいります．

最後に改めて、貴財団からのご支援に深く感謝申し上げます．