Exhibit A
(Submitted Under Seal)

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SAN JOSE DIVISION

APPLE INC., a California corporation,

Plaintiff,

v.

SAMSUNG ELECTRONICS CO., LTD., A Korean business entity; SAMSUNG ELECTRONICS AMERICA, INC., a New York corporation; SAMSUNG TELECOMMUNICATIONS AMERICA, LLC, a Delaware limited liability company,

Defendants.

Case No. 11-cv-01846-LHK

REBUTTAL EXPERT REPORT OF DR. ALAN HEDGE

****CONFIDENTIAL – CONTAINS MATERIAL DESIGNATED AS HIGHLY CONFIDENTIAL – ATTORNEYS' EYES ONLY PURSUANT TO A PROTECTIVE ORDER****

TABLE OF CONTENTS

REBUTTAL EXPERT REPORT OF DR. ALAN HEDGE

I. INTRODUCTION

1. I, Dr. Alan Hedge, submit this Rebuttal Expert Report in connection with certain patent, trade dress, and trademark claims being asserted by Apple Inc. ("Apple") in the above-captioned case. I have been informed that Apple has alleged that Defendants Samsung Electronics Co. Ltd., Samsung Electronics America, Inc., and Samsung Telecommunications America, LLC (collectively, "Samsung") have infringed Apple's patents, trade dress, and trademarks.

2. This Rebuttal Expert Report is in rebuttal to the Expert Report of Mark Lehto dated March 22, 2012.

II. QUALIFICATIONS

3. I am a Full Professor in the Department of Design and Environmental Analysis at Cornell University and a Research Professor in the Department of Mechanical and Aerospace Engineering at Syracuse University. At Cornell, I have directed the Human Factors and Ergonomics teaching and research programs, including the Human Factors and Ergonomics laboratory, since 1987. Before joining Cornell, I was a tenured Lecturer and ran the Graduate Program in Applied Psychology and Ergonomics at Aston University, Birmingham, U.K.[1] From 1990-1993, I was also an Honorary Research Fellow at the Institute of Occupational Health, University of Birmingham, U.K.

4. My research and teaching activities have focused on issues of design and workplace ergonomics as these affect the health, comfort, and productivity of workers. My research themes include alternative keyboard and input system designs (such as computer mice and multitouch surfaces); product and workstation design and musculoskeletal injury (*e.g.*, carpal

[1] In the U.K. university system, a Lecturer is equivalent to an assistant professor.

tunnel syndrome) risk factors for users; the performance and health effects of postural strain; and the health and comfort impacts of various environmental stressors, such as the effects of indoor air quality on sick building syndrome complaints among office workers and the effects of office lighting on eyestrain problems among computer workers. I have co-authored the book *Healthy Buildings*, and I have co-edited *Advances in Ergonomics Modeling and Usability Evaluation* and the *Handbook of Human Factors and Ergonomics Methods*. I have published 35 book chapters, 55 refereed journal articles, 140 refereed conference proceedings, 40 other conference proceedings, 26 other articles, and 13 legislative reports on the above topics.

5. I received the 2003 Alexander J. Williams Jr. Design Award from the Human Factors and Ergonomics Society for "outstanding human factors contributions to the design of a major operational system." This work included the design of a multifunction hand-operated joystick controller and a hand-operated driving wheel control, as well as the design of information displays. I received the 2009 Oliver Keith Hansen Outreach Award from the Human Factors and Ergonomics Society for significant activities that broaden awareness of the existence of the human factors/ergonomics profession and the benefits it brings to humankind.

6. My professional activities in the field of Human Factors and Ergonomics have been extensive. I am a Fellow of the Human Factors and Ergonomics Society (U.S.A.); a Fellow of the International Ergonomics Association; a Fellow of the Institute of Ergonomics and Human Factors (formerly the Ergonomics Society, U.K.); and a Certified Professional Ergonomist. I am a member of the Editorial boards of the journals *Ergonomics*, *Theoretical Issues in Ergonomics*, *Work*, *International Journal of Human Factors and Ergonomics*, *Journal of Environmental Psychology*, and *The Open Ergonomics Journal*.

7. I have chaired the Work Environment technical group of the International Ergonomics Association (IEA) and the Work Environment Design Technical Subcommittee of

the US Human Factors and Ergonomics Society Technical Advisory Group to the International Standards Organization, as well as the Work Environment subcommittee of the BSR/HFES 100 Computer Workstation Standard Revision Committee. I serve on Advisory Boards for the National Ergonomics Industry Advisory Board, Ergoweb, and HealthyComputing.com.

8. I started my academic career as a Biologist. I hold a First Class Special Honors B.S. degree (1970) and an M.S. (1971) in Zoology from the University of Sheffield, U.K. I then obtained an M.S. degree in Applied Psychology (1972) that included the study of Human Factors and of Ergonomics in the Department of Applied Psychology at Aston University in Birmingham, U.K, then the leading center for Ergonomics in the U.K. My thesis investigated the effects of spatial compatibility in the design of computer controls and displays. I then extended this spatial compatibility research and obtained a Ph.D. (1972-74, submitted and awarded 1979) in Cognitive Psychology at the University of Sheffield, U.K.

9. In 1974, I began working as a Research Assistant in local government in South Yorkshire MCC, U.K. In 1975, I became a Principal Research Officer in local government with West Midlands MCC, U.K. I began as a Lecturer in the Department of Applied Psychology at Aston University in 1976 and received tenure in 1979. In 1987, I moved to Cornell University as an Associate Professor to direct the Human Factors and Ergonomics programs in the Department of Design and Environmental Analysis. I became a Full Professor in 1995 and I continue to work at Cornell University. I have undertaken collaborative research at Syracuse University and I have also been a Research Professor in the College of Engineering there since 2006.

10. My experiences include conducting a substantial amount of human factors and ergonomics-related teaching. Since 1987, I have taught classes to undergraduate and graduate students that include the principles of designing ergonomic hand-operated devices. In my

capacity as a consultant, I have also taught these materials to an international hand tools manufacturer. Additionally, I have authored two book chapters on these principles.

11. My experiences also include providing consulting services to input device manufacturers and industrial design firms in connection with projects relating to the design of ergonomic input devices. Starting in 1990, I was the first ergonomic researcher to investigate and study benefits of a downward sloping keyboard arrangement to place the hands in a neutral posture while typing. In the same time period, I consulted with an industrial design firm on the design of a downward sloping keyboard platform, which resulted in an Industrial Design Excellence Gold Award from *Business Week* and an Institute of Business Designers (IBD)/Contract Magazine Bronze Award for the ergonomic design of the PROTEX computer keyboard/mouse tray system in 1992. I have consulted with various industrial design firms and with manufacturers of computer products on the design of hand-operated devices ranging from computer mice to video game controllers. In 2002, I began consulting work on the design of products using multitouch input (*e.g.*, iGesture pad, iNumber pad, iMini, Touchstream keyboards, prototype laptop) with Fingerworks. I have also consulted with major consumer product manufacturers on the cognitive ergonomic design of their products and their packaging.

12. I was awarded U.S. Patent No. 6,568,650 for a laptop computer accessory jointly with an industrial designer, Eugene Helmetsie.

13. A copy of my *curriculum vitae* is attached as Exhibit 1. A list of proceedings in which I have testified as an expert in the past four years is attached as Exhibit 2.

III. SUMMARY OF TASK AND CONCLUSIONS

14. This Rebuttal Expert Report contains my initial opinions concerning the statements and opinions contained in the initial Expert Report of Dr. Mark Lehto ("Lehto Report"), which is dated March 22, 2012, and relates to U.S. Patent Nos. D504,889 (the "D'889

Patent"), D593,087 (the "D'087 Patent"), D618,677 (the "D'677 Patent"), D622,270 (the "D'270 Patent"), D627,790 (the "D'790 Patent"), D604,305 (the "D'305 Patent"), and D617,334 (the "D'334 Patent") and Apple's asserted trade dress and trademarks. Collectively, I refer to the design patents mentioned above as the "Asserted Design Patents."

15. I have been informed that Apple is disputing the timeliness of Samsung's disclosure of the arguments covered by Dr. Lehto's report.

16. In general, I understand that my task is to review materials and to provide teaching and opinions as to whether the designs in the Asserted Design Patents and Apple's asserted trade dress and trademarks are dictated by principles of ergonomics and human factors. I am informed that additional experts will be addressing other related issues.

17. This Rebuttal Expert Report is not intended to be an exhaustive explanation of every point in the Lehto Report with which I disagree. I may express my opinion on additional statements or opinions in the Lehto Report when appropriate.

18. In forming the opinions expressed in this Rebuttal Expert Report, I relied on the Lehto Report, the Asserted Design Patents, and certain publicly available materials. A list of the documents I considered and relied upon is attached as Exhibit 3.

19. I reserve the right to rely upon any additional information or materials that may be provided to me or that are relied upon by any of Samsung's experts or witnesses if I am asked to testify or give additional opinions regarding this matter.

IV. COMPENSATION

20. I am being compensated at a rate of $605 per hour for testifying at deposition and trial and $555 per hour for non-testifying work. My compensation is in no way contingent upon the outcome of this case or any other litigation or upon the nature of the opinions I express.

V. RELEVANT LEGAL PRINCIPLES

A. The Law of Design Patent Functionality

21. I have not been asked to offer an opinion on the law. However, as an expert opining on whether ergonomics and human-factors considerations render the designs claimed in the Asserted Design Patents to be dictated by function, I understand that I am obliged to follow existing law.

22. I understand that a design patent is directed to the appearance of an article of manufacture and that functional designs cannot be patented. I further understand that "[i]n determining whether a design is primarily functional or primarily ornamental the claimed design is viewed in its entirety, for the ultimate question is not the functional or decorative aspect of each separate feature, but rather the overall appearance of the article, in determining whether the claimed design is dictated by the utilitarian purpose of the article."[2]

23. I also understand that under the functionality analysis, the relevant inquiry is not whether the design performs or serves a function, because all useful articles perform some function, but rather whether the design is "'dictated'" by function.[3] "A design patent is directed to the appearance of an article of manufacture,"[4] and "the fact that the article of manufacture serves a function is a prerequisite of design patentability, not a defeat thereof."[5] "An article of manufacture necessarily serves a utilitarian purpose, and the design of a useful article is deemed to be functional when the appearance of the claimed design is 'dictated by' the use or purpose of the article. If the particular design is essential to the use of the article, it can not be the subject of a design patent."[6] I have also been informed that when there are several ways to achieve the

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[2] *L.A. Gear, Inc. v. Thom McAn Shoe Co.*, 988 F.2d 1117, 1123 (Fed. Cir. 1993).
[3] *See id.*
[4] *Id.* (internal citation omitted).
[5] *Hupp v. Siroflex of Am., Inc.*, 122 F.3d 1456, 1460 (Fed. Cir. 1997).
[6] *L.A. Gear*, 988 F.2d at 1123 (internal citations omitted).

function of an article of manufacture, "[a] design is not dictated solely by its function."[7] Similarly, if other designs could achieve the same or similar functional capabilities, "the design of the article in question is likely ornamental, not functional."[8]

B. The Law of Trade Dress and Trademark Functionality

24. I have not been asked to offer an opinion on the law. However, as an expert opining on whether ergonomics and human-factors considerations render Apple's asserted trade dress and trademarks functional, I understand that I am obliged to follow existing law. I have been informed by counsel that product design trade dress is entitled to protection only if it is nonfunctional. A trade dress is functional "if it is essential to the product's use or if it [favorably] affects the cost and quality of the article."[9]

25. I understand that in determining functionality, a product's trade dress must be analyzed as a whole, and not by its individual elements.[10] "The fact that individual elements of the trade dress may be functional does not necessarily mean that the trade dress as a whole is functional."[11]

26. I understand that courts generally consider four factors in assessing the functionality of a trade dress:

(1) Whether the design yields a utilitarian advantage;

(2) Whether alternative designs are available;

(3) Whether advertising touts the utilitarian advantages of the design; and

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[7] *See Best Lock Corp. v. Ilco Unican*, 94 F.3d 1563, 1566 (Fed. Cir. 1996).

[8] *L.A. Gear*, 988 F.2d at 1123; *see also Rosco,Inc. v. Mirror Lite Co.*, 304 F.3d 1373, 1378 (Fed. Cir. 2002).

[9] *Fuddruckers, Inc. v. Doc's B.R. Others, Inc.*, 826 F.2d 837, 843 (9th Cir. 1987).

[10] *Fuddruckers*, 826 F.2d at 842 ("functional elements that are separately unprotectable can be protected together as part of a trade dress").

[11] *Clicks Billiards, Inc. v. Sixshooters, Inc.*, 251 F.3d 1252, 1259 (9th Cir. 2001) (emphasis in original).

(4) Whether the particular design results from a comparatively simple or inexpensive method of manufacture.[12]

VI. APPLE'S ASSERTED DESIGNS AND TRADE DRESS

A. The D'087 Patent

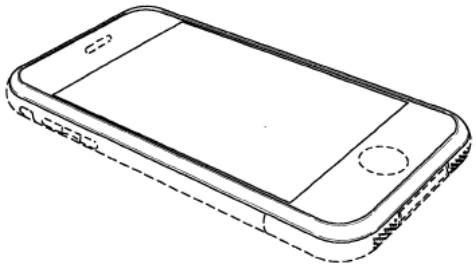

FIG. 9

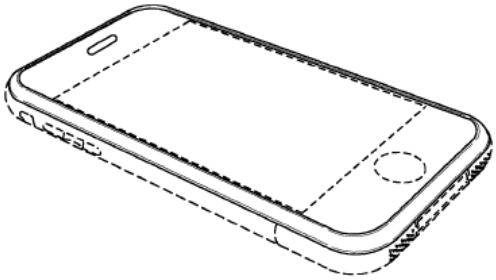

FIG. 17

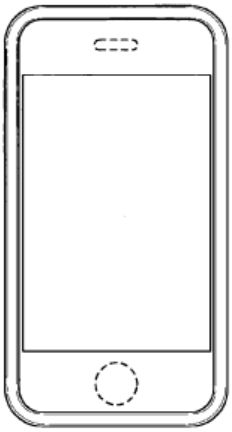

FIG. 11

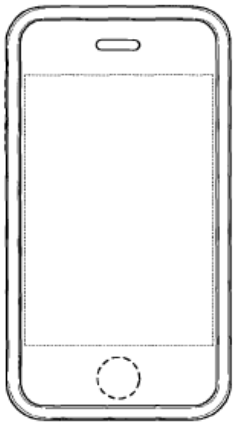

FIG. 19

FIG. 7

FIG. 8

FIG. 5

FIG. 6

27. The D'087 Patent is directed toward the ornamental design of the front face and bezel of an electronic device as shown in selected embodiments as depicted in Figures 5–9, 11, 17 & 19 (reproduced above).[13] Attached as Exhibit 4 is a true and correct copy of the D'087 Patent.

[12] *Disc Golf Ass'n, Inc. v. Champion Discs, Inc.*, 158 F.3d 1002, 1006 (9th Cir. 1998).

[13] In this report, images of the Asserted Design Patents, Apple's asserted trade dress and trademarks, alternative designs, and Apple products have been scaled so that they correspond with one another. Care has been taken not to change the proportional relationship (*i.e.*, aspect ratio) of the images.

28. The D'087 Patent states that "The broken lines showing the remainder of the electronic device are directed to environment. The broken lines, within the claimed design, in embodiments 1, 2, and 4 that depict an elongated oval shape and the broken lines, within the claimed design, in embodiments 2, 3, and 6 that depict a circle shape are superimposed on a continuous surface and are for illustrative purposes only. The broken lines, within the claimed design, in embodiments 1, 3, and 5 that depict a large rectangular shape, indicate a non claimed shape below the continuous front surface and are for illustrative purposes only. None of the broken lines form a part of the claimed design."[14]

29. I understand that the D'087 Patent is embodied by Apple's original iPhone, iPhone 3G, and iPhone 3GS.

[14] D'087 Patent at Description.

B. The D'677 Patent

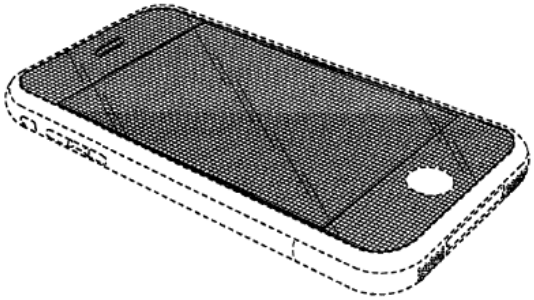

FIG. 1

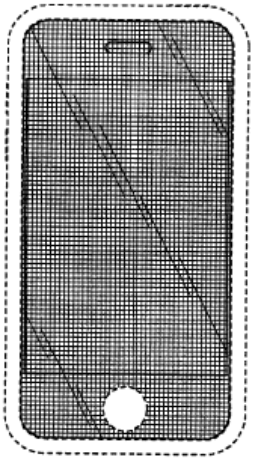

FIG. 3

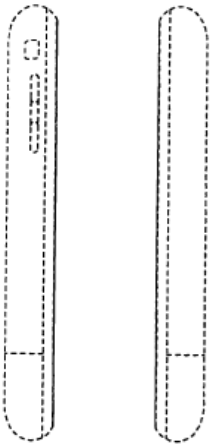

FIG. 7

FIG. 8

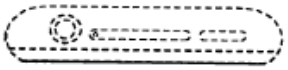

FIG. 5

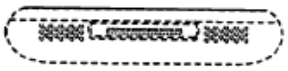

FIG. 6

30. The D'677 Patent is directed toward the ornamental design of the front face of the iPhone as shown in Figures 1, 3 & 5–8 (reproduced above). Attached as Exhibit 5 is a true and correct copy of the D'677 Patent.

31. The D'677 Patent states that "The claimed surface of the electronic device is illustrated with the color designation for the color black."[15]

32. I understand that the design disclosed in the D'677 Patent is embodied by Apple's original iPhone, iPhone 3G, iPhone 3GS, iPhone 4, and iPhone 4S.

[15] D'677 Patent at Description.

C. The D'270 Patent

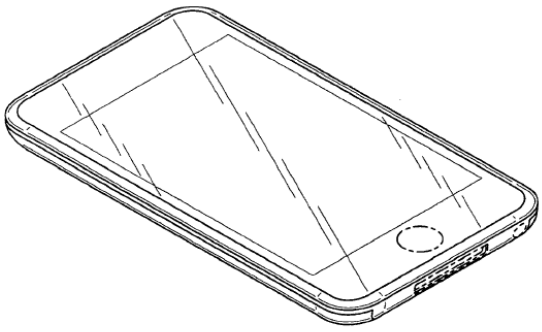

FIG. 1

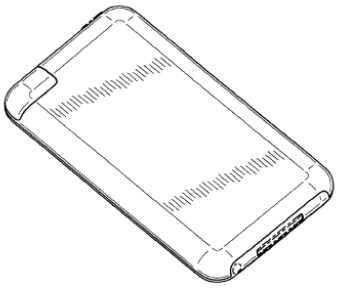

FIG. 2

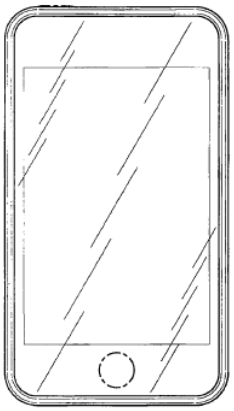

FIG. 3

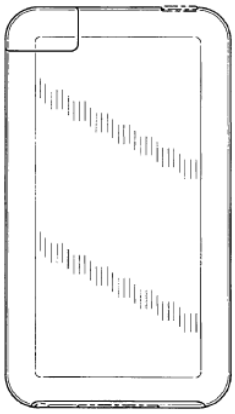

FIG. 4

FIG. 5

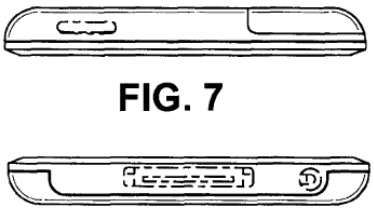

FIG. 7

FIG. 8

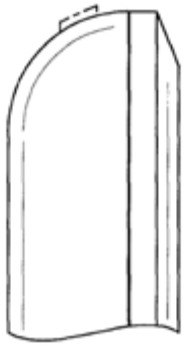

FIG. 9

33. The D'270 Patent is directed toward the ornamental design of the body and front face of an electronic device as shown in Figures 1–9 (reproduced above). Attached as Exhibit 6 is a true and correct copy of the D'270 Patent.

34. The D'270 Patent states that "The broken lines show portions of the electronic device which form no part of the claimed design."[16]

35. I understand that the design disclosed in the D'270 Patent is embodied by Apple's iPod touch.

D. The D'889 Patent

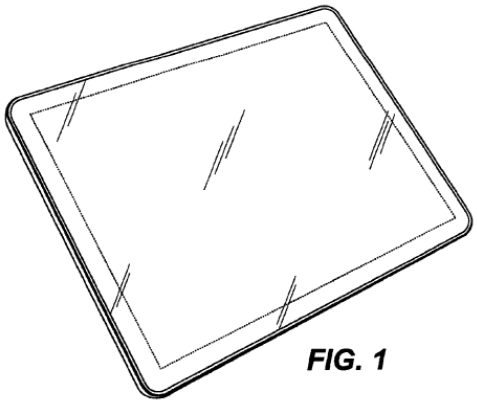

FIG. 1

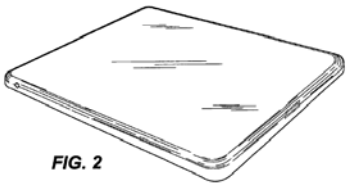

FIG. 2

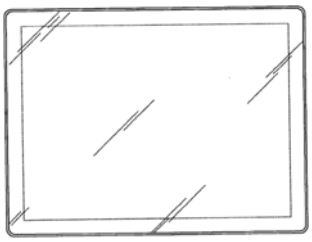

FIG. 3

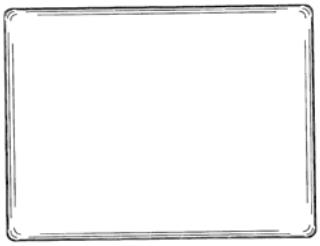

FIG. 4

FIG. 5

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FIG. 6

FIG. 8

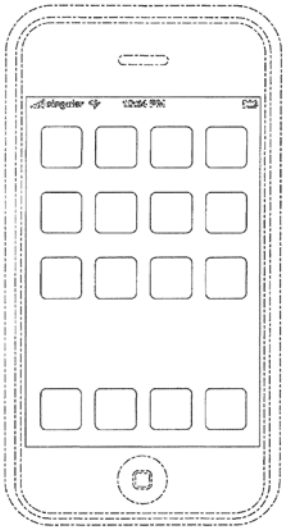
FIG. 9

36. The D'889 Patent is directed toward the ornamental design of an electronic device as shown in Figures 1–9 (reproduced above). Attached as Exhibit 7 is a true and correct copy of the D'889 Patent.

[16] D'270 Patent at Description.

37. I understand that the design disclosed in the D'889 Patent is embodied by Apple's iPad 2.

E. The D'790 Patent



D'790 Figure 1

38. The D'790 Patent depicts an overall appearance for the layout and shape of icons in a graphical user interface for a display screen. A 4 x 3 array (4 columns, 3 rows) of rounded rectangular or square shapes, which appear to be squares with rounded corners, is shown in the top portion of a display screen. A separate row of rounded rectangular shapes is shown along the bottom of the display screen. In both the 4 x 3 array and the row along the bottom of the display screen, the shapes are evenly spaced horizontally. Within the 4 x 3 array, the shapes are evenly spaced vertically, with slightly more space vertically than horizontally. The width:height ratio of the display screen is approximately 1:1.5. Attached as Exhibit 8 is a true and correct copy of the D'790 Patent.

39. I understand that the design disclosed in the D'790 Patent is embodied by Apple's original iPhone, iPhone 3G, iPhone 3GS, iPhone 4, and iPhone 4S.

F. The D'305 Patent

D'305 Figure 1[17]

40. The D'305 Patent depicts icons displayed on a display screen. The width:height ratio of the display screen is approximately 1:1.5. There is a 4 x 3 array (4 columns, 3 rows) on a black background, with an additional row of icons in a gray gradient area at the bottom of the screen. Approximately the top 80% appears as a solid black background containing the 4 x 3 array. Against the black background, the 12 icons in the top portion provide a bright contrast and appear virtually illuminated against the black. The lower approximately 20% of the screen has a gray gradient-patterned background containing the additional row of icons—the main effect being that the top part and lower part of the screen appear as separate, bounded areas, setting off the

[17] Although the D'305 patent was published in black-and-white, I have been informed that this color image submitted during prosecution of the patent is available from the U.S. Patent and Trademark Office ("USPTO"). I have also been informed that this drawing corresponds to Figure 1 in the issued patent, and that this drawing has been produced to Samsung by Apple in this proceeding. *See* APLNDC-Y0000232557–232608 at 232558.

icons in the lower part as a separate group. The icons in the D'305 Patent have the shape of squares with rounded corners. Under each icon there is gray text that describes the application represented by the icon. There is a band across the top of the screen displaying information: signal strength, carrier name, time, and battery charge status. Attached as Exhibit 9 is a true and correct copy of the D'305 Patent.

41. I understand that the design disclosed in the D'305 Patent is embodied by Apple's original iPhone, iPhone 3G, iPhone 3GS, iPhone 4, and iPhone 4S.

G. The D'334 Patent

D'334 Patent Figure 6[18]

[18] I have been informed that the D'334 does not incorporate the color versions of the designs submitted during prosecution of the patent. I have been informed that this figure is an image submitted during prosecution of the patent that corresponds to Figure 6 in the issued patent and is available from the USPTO. I have included this image because it is a higher quality image than what can be reproduced from the printed patent, and I have been informed that this drawing has been produced to Samsung by Apple in this proceeding. *See* APLNDC-0000237387–237394 at Y0000237392.

42. The D'334 Patent shows a display screen like the one shown in the D'305 Patent except with two additional features. First, there are additional icons placed in a fourth row in the top portion of the screen. Second, there is a row of dots between the top portion and the bottom portion of the screen. The width:height ratio of the display screen is approximately 1:1.5. Attached as Exhibit 10 is a true and correct copy of the D'334 Patent.

43. I understand that the design disclosed in the D'334 Patent is embodied by Apple's iPhone 3G, iPhone 3GS, iPhone 4, and iPhone 4S.

H. Apple's Asserted Trade Dress and Trademarks

44. I understand that the trade dress at issue involves the distinctive shape and appearance of certain Apple products. In particular, I understand that the original iPhone trade dress (the "Original iPhone Trade Dress") includes:

- a rectangular product with four evenly rounded corners;
- a flat clear surface covering the front of the product;
- the appearance of a metallic bezel around the flat clear surface;
- a display screen under the clear surface;
- under the clear surface, substantial black borders above and below the display screen and narrower black borders on either side of the screen;
- when the device is on, a matrix of colorful square icons with evenly rounded corners within the display screen; and
- when the device is on, a bottom dock of colorful square icons with evenly rounded corners set off from the other icons on the display, which does not change as other pages of the user interface are viewed.[19]

[19] *Apple Inc., v. Samsung Electronics Co., Ltd.*, Amended Complaint, U.S. District Court, Northern District of California, Case No: 11-cv-01846-LHK ("Am. Compl.") ¶ 57.

45. The iPhone 3G trade dress includes all of the elements of the Original iPhone Trade Dress, plus "when the device is on, a row of small dots on the display screen" (the "iPhone 3G Trade Dress").[20]

46. The iPhone 4 trade dress includes all of the elements of the Original iPhone Trade Dress and the iPhone 3G Trade Dress except that it does not have a metallic bezel, but does have a thin metallic band around the outside edge of the iPhone 4, which creates a thin rim adjacent to the face of the phone (the "iPhone 4 Trade Dress").[21] The iPhone 4's profile is also flatter than the previous versions of the iPhone.

47. The iPhone trade dress (the "iPhone Trade Dress") includes the elements that are common to all versions of the iPhone, namely:

- a rectangular product with four evenly rounded corners;
- a flat clear surface covering the front of the product;
- a display screen under the clear surface;
- under the clear surface, substantial neutral (black and white) borders above and below the display screen and narrower neutral borders on either side of the screen;
- when the device is on, a matrix of colorful square icons with evenly rounded corners within the display screen; and
- when the device is on, a bottom dock of colorful square icons with evenly rounded corners set off from the other icons on the display, which does not change as other pages of the user interface are viewed.[22]

[20] Am. Compl. ¶¶ 35, 59–60. The iPhone 3G Trade Dress also applies to iPhone 3GS. *See* Am. Compl. ¶ 35.

[21] Am. Compl. ¶¶ 37, 61–62.

[22] Am. Compl. ¶¶ 63–64.

48. I understand that another Apple product at issue in this case, the iPod touch, builds upon the original iPhone's appearance and configuration and includes all of the elements of the iPhone Trade Dress.

49. Moreover, the trade dress registered in U.S. Registration No. 3,470,983 consists of the following image shown in the registration:

The registration describes this trade dress as follows:

> The color(s) black, blue, brown, brown-gray, gray-green, green, orange, red, silver, tan, white and yellow is/are claimed as a feature of the mark. The mark consists of the configuration of a rectangular handheld mobile digital electronic device with rounded silver edges, a black face, and an array of 16 square icons with rounded edges. The top 12 icons appear on a black background, and the bottom 4 appear on a silver background. The first icon depicts the letters "SMS" in green inside a white speech bubble on a green background; the second icon is white with a thin red stripe at the top; the third icon depicts a sunflower with yellow petals, a brown center, and a green stem in front of a blue sky; the fourth icon depicts a camera lens with a black barrel and blue glass on a silver background; the fifth icon depicts a tan television console with brown knobs and a gray-green screen; the sixth icon depicts a white graph line on a blue background; the seventh icon depicts a map with yellow and orange roads, a pin with a red head, and a red-and- blue road sign with the numeral "280" in white; the eighth icon depicts an orange sun on a blue background, with the temperature in white; the ninth icon depicts a white clock with black and red hands and numerals on a black background; the tenth icon depicts three brown-gray circles and one orange circle on a black background with a white border, with the mathematical symbols for addition, subtraction, multiplication, and the equal sign

> displayed in white on the circles; the eleventh icon depicts a portion of a yellow notepad with blue and red ruling, with brown binding at the top; the twelfth icon depicts three silver gears over a thatched black-and-silver background; the thirteenth icon depicts a white telephone receiver against a green background; the fourteenth icon depicts a white envelope over a blue sky with white clouds; the fifteenth icon depicts a white compass with a white- and-red needle over a blue map; the sixteenth icon depicts the distinctive configuration of applicant's media player device in white over an orange background.[23]

Attached as Exhibit 11 is a true and correct copy of U.S. Registration No. 3,470,983.

50. The trade dress registered in U.S. Registration No. 3,457,218 consists of the following image shown in the registration:

The registration describes this trade dress as follows:

> The mark consists of the configuration of a rectangular handheld mobile digital electronic device with rounded corners. The matter shown in broken lines is not part of the mark.[24]

Attached as Exhibit 12 is a true and correct copy of U.S. Registration No. 3,457,218.

51. The trade dress registered in U.S. Registration No. 3,475,327 consists of the following image shown in the registration:

The registration describes this trade dress as follows:

[23] APLNDC-Y0000182302–182304.
[24] APLNDC-Y0000182305–182306.

> The color(s) gray, silver and black is/are claimed as a feature of the mark. The mark consists of the configuration of a handheld mobile digital electronic device. The material shown in dotted lines, namely, the buttons and openings on the device show the position of the mark in relation to the device and are not considered a part of the mark. The color gray appears as a rectangle at the front, center of the device. The color black appears on the front of the device above and below the gray rectangle and on the curved corners of the device. The color silver appears as the outer border and sides of the device. The color white is shown solely to identify placement of the mark and is not claimed as a part of the mark.[25]

Attached as Exhibit 13 is a true and correct copy of U.S. Registration No. 3,475,327.

52. In addition to the trade dress associated with the various generations of the iPhone and iPod touch, the trade dress associated with Apple's tablet computers, namely the iPad and the iPad 2, are also at issue. The iPad trade dress (the "iPad Trade Dress") includes:

- a rectangular product with four evenly rounded corners;
- a flat clear surface covering the front of the product;
- the appearance of a metallic rim around the flat clear surface;
- a display screen under the clear surface;
- under the clear surface, substantial neutral (black or white) borders on all sides of the display screen; and
- when the device is on, a matrix of colorful square icons with evenly rounded corners within the display screen.[26]

53. The iPad 2 trade dress (the "iPad 2 Trade Dress") at issue includes all of the elements of the iPad Trade Dress.[27] The overall appearance of the iPad and iPad 2 provides an extremely thin side profile, making the products appear to be relatively flat when placed on the table.

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[25] APLNDC-Y0000182307–182308.
[26] Am. Compl. ¶¶ 65–66.
[27] Am. Compl. ¶¶ 65–68.

54. I understand that the trademarks at issue represent various application icons. I understand that Apple has asserted trademark rights in the following icon images[28]:

VII. PRINCIPLES OF ERGONOMICS AND HUMAN FACTORS

A. Overview

55. The term "ergonomics" means "the laws of work," derived from the Greek "ergon" (work) and "nomos" (natural laws).[29] Formalized in Great Britain after the end of World War II, it was founded as a human-performance-oriented engineering design discipline.[30] In the United States, the equivalent discipline was called "human factors."[31] Today, both terms are often used together and interchangeably. The discipline is defined by the International Ergonomics Association as follows: "Ergonomics (or human factors) is the scientific discipline

[28] The icons shown here are the subject of the following USPTO trademark registrations and application: U.S. Registration Nos. 3,886,196 (APLNDC-Y00000182288–182289), 3,889,642 (APLNDC-Y00000182290–182291), 3,886,200 (APLNDC-Y00000182292–182293), 3,889,685 (APLNDC-Y00000182294–182295), 3,886,169 (APLNDC-Y00000182296–182297), 3,886,197 (APLNDC-Y00000182298–182299), and 2,935,038 (APLNDC-Y00000182300–182301), and U.S. Application Serial No. 85/041,463 (APLNDC-Y00000183090–183097). Attached as Exhibits 14–20 are true and correct copies of U.S. Registration Nos. 3,886,196; 3,889,642; 3,886,200; 3,889,685; 3,886,169; 3,886,197; and 2,935,038. Attached as Exhibit 21 is a true and correct copy of U.S. Application Serial No. 85/041,463.

[29] Alan Hedge, *Ergonomics and Design: Applying the Laws of Work*, 2 INFORMEDESIGN, no. 3, at 1, *available at* http://www.informedesign.org/_news/mar_v02-p.pdf.

[30] *Id.*

[31] *Id.*

concerned with the understanding of the interactions among human and other elements of a system, and the profession that applies theory, principles, data and methods to design in order to optimize human well-being and overall system performance."[32] The distinguishing characteristic of ergonomics is that it applies scientific study to the design of products, and as such it blends aspects of both science and art.

56. Ergonomists study ways of optimizing the design of people-technology systems, using a variety of sources, including information on human physical and mental abilities that affect performance and reliability, anthropometrics, work physiology, biomechanics, social behavior, and work environment conditions.[33] To determine whether a product is ergonomically designed, typical factors to consider include: whether the product feels comfortable to use, whether the product puts the user in a more neutral posture, whether the product improves safety, whether the product enhances performance and efficiency, whether the manufacturer/designer can clearly articulate what the ergonomic objectives were for a specific design element (*i.e.*, why the product was designed the way it was), and whether the manufacturer/designer has any research evidence to demonstrate that the particular product works in an ergonomically proper way.[34] This also includes consideration of the cognitive components of a product, such as its form and appearance, that relate to the ornamental design of a product.[35] This interplay between physical considerations that focus on performance and comfort, on the one hand, and cognitive considerations that focus on aesthetics and desirability, on the other, is at the core of the study of ergonomics as it relates to consumer products. To be successful, a product needs to be both

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[32] INT'L ERGONOMICS ASS'N, http://www.iea.cc/01_what?What%20is%20Ergonomics.html.

[33] Alan Hedge, *Ergonomics and Design: Applying the Laws of Work*, 2 INFORMEDESIGN, no. 3, at 1, available at http://www.informedesign.org/_news/mar_v02-p.pdf.

[34] *Id.* at 3.

[35] Alan Hedge, *Consumer Product Design*, *in* 2 ENCYCLOPEDIA OF ERGONOMICS AND HUMAN FACTORS 1555–1560 (W. Karwowski ed., 2d ed. 2006).

functional and desirable to use. Ergonomics advocates human-centered design. Ergonomics does not dictate the design of a product but rather it recommends ways of designing products to perform the desired functions in an optimal way for the human user.

57. This analysis also takes into consideration the trade-offs of designing a product in a particular way in light of the product's intended uses, customer demographics, and environments in which the product is likely to be used. For example, to achieve optimal design for a handheld device that is primarily used for typing, the designer will have to take into consideration a different set of factors than for a device that is primarily used for verbal communication, or one that is primarily used for entertainment, such as watching videos or playing video games. A device that is intended for multiple uses—for example, a handheld device that can be used for verbal communication as well as watching videos—will inevitably reflect compromises that an ergonomically minded designer would have to make.

B. Application of These Principles in the Design Process

58. Large manufacturing companies often either include professionals educated in ergonomics principles as members of in-house design teams or outsource such work to consultants. An ergonomist may, for example, help with the initial assessment of how and in what environments the product will be used in order to design a set of specifications that the industrial designers would then implement in various prototypes. Once the designers develop a pre-production model, the ergonomists may test the physical model with actual users. Depending on the results of those tests, the designers may go back to the drawing board to reassess the product's design.

59. The process of ergonomic design is described in ISO 26800:2011 (Ergonomics — General approach, principles and concepts), which "presents the general ergonomics approach and specifies basic ergonomics principles and concepts" and emphasizes human-centered

design.[36] The goal of ergonomics is to strive continually to develop new and better ways to optimize the performance of people using products, including by improving the design of products.[37] Yet, ergonomists usually are not designers who conceive of product designs. Designers aim to create distinctive, unique designs. While ergonomic principles may frame the total universe of options, that universe nonetheless includes many available design options and designers thus invariably must make design-driven choices on whether and how to adopt ergonomic considerations. Thus, ergonomic/human factors considerations are only one component of the overall design process.

C. Application of These Principles to the Design of Handheld Devices

60. Several principles of ergonomic design consistently apply to the design of handheld products. Some of these principles relate to the shape and form of the product.[38] Of paramount importance among these is: "When designing a handheld device, the smallest and largest users in the target population must be able to grasp, view and manipulate the product (typically, the 5th percentile female and 95th percentile male)."[39] Two key considerations regarding whether a product meets this requirement are (1) hand dimensions for a 5th percentile female and 95th percentile male and (2) grip strength for a 5th percentile female and 95th percentile male. While no fixed-width handheld product can cover this entire subset of the population, ergonomic considerations counsel maximizing the number who can grasp, view, and manipulate the device.

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[36] INT'L ORGANIZATION FOR STANDARDIZATION, ERGONOMICS—GENERAL APPROACH, PRINCIPLES AND CONCEPTS, ISO 26800:2011, *available at* http://www.iso.org/iso/iso_catalogue/catalogue_tc/catalogue_detail.htm?csnumber=42885.

[37] For a description of the process of ergonomic design, see generally ERGONOMICS—GENERAL APPROACH, PRINCIPLES AND CONCEPTS (ISO 26800:2011).

[38] Alan Hedge, *Ergonomic Design of Hand-Operated Devices, in* HUMAN FACTORS IN CONSUMER PRODUCTS 203–222 (N. Stanton ed., Taylor & Francis 1998).

[39] J.R. Lewis, P.M. Commarford, P.J. Kennedy & W.J. Sadowski, *Handheld Electronic Devices*, 4 REVIEWS OF HUMAN FACTORS & ERGONOMICS 105, 106 (2008).

VIII. THE DESIGNS IN THE D'087, D'677, D'270 PATENTS ARE NOT DICTATED BY PRINCIPLES OF ERGONOMICS AND HUMAN FACTORS

A. The Principles of Ergonomics and Human Factors Do Not Dictate Any Particular Design for a Smartphone or Media Player.

61. As detailed below, in my opinion, considerations of ergonomics and human factors do not compel a particular design, or any element of ornamental design, for a smartphone. Rather, principles of ergonomics are guidelines that allow for substantial design variations for devices that provide the same functionality. It is my understanding that smartphones, such as the various generations of the iPhone, can be used for making phone calls, sending and receiving emails or text messages, surfing the internet, running applications, playing games, and taking pictures, among other things. I also understand that media players, such as the various generations of the iPod touch, can be used for surfing the internet, running applications, playing games, watching videos, and listening to music, among other things. In my opinion, the variety of different smartphones on the market confirms that ergonomic principles impose minimal restrictions on the design choices available to smartphone designers and do not dictate any particular smartphone design, let alone the specific designs set forth in the D'087, D'677, and D'270 patents.

62. The various functions performed by a smartphone also highlight the significance of design trade-offs; namely, the fact that designs that are advantageous for certain functions may be disadvantageous for other functions so trade-offs are made in the design process. A smartphone with a larger keyboard may facilitate easier and more accurate typing, or a larger touchscreen may facilitate easier viewing, but a larger device may fit less comfortably in smaller hands or be less comfortable when held against the ear on phone calls. I have personally examined a number of samples of different smartphones and I have visited websites that provide

pictures and other information of an even larger number of smartphones.[40] Based on this review, it is clear to me that there are a large number of ergonomically acceptable smartphones that have a wide variety of form factors in light of the goals that these devices are intended to achieve. Indeed, Samsung alone manufactures a wide variety of smartphones, many of which have substantially different form factors.

1. Dr. Lehto has not identified ergonomic principles that would dictate a particular smartphone design.

63. Dr. Lehto has not pointed to any guidelines or principles that support his position that the D'087, D'677, and D'270 patented designs are dictated by the function, purpose, or use of smartphones.

a. Apple iOS Human Interface Guidelines

64. Dr. Lehto refers to the "Apple iOS Human Interface Guidelines" to support the proposition that "contemporary design of electronic devices involves a process of systematically analyzing the needs and wants of the intended customer, and assessing the degree to which the provided features satisfy these requirements."[41] These Guidelines are directed to the developers of software 'apps' that run on the iOS operating system and there is nothing to suggest they had any impact on the physical hardware designs of the various generations of the iPhone and the iPod touch or the D'087, D'677, and D'270 design patents.

b. Apple's design process

65. Dr. Lehto also suggests that "frameworks such as Quality Function Deployment (QFD) are often used to systematically relate a large set of functional requirements, such as ease of use, safety, reliability, and quality, to the design features of a product" and that this "analysis is

[40] *See, e.g.*, http://www.gsmarena.com.

[41] Lehto Report at 5, 16. The Apple iOS Human Interface Guidelines may be found at: http://developer.apple.com/library/ios/documentation/UserExperience/Conceptual/MobileHIG/MobileHIG.pdf.

typically done for each stage of customer use of the product" and that such analyses are "essential to ensure the product adequately performs its intended functions for the intended group of consumers."[42] Dr. Lehto does not cite to any evidence indicating that Apple applies the QFD framework to its design process, nor am I aware of any such evidence.

66. Moreover, Dr. Lehto states that "[t]he testimony of Apple designers and named inventors indicates that Apple considered ergonomic factors and that the designs satisfy functional considerations."[43] I have read the pages of the transcript cited by Dr. Lehto as support for this statement,[44] and they do not indicate that ornamental design decisions relating to Apple's patented designs were dictated principles of ergonomics or human factors. Rather, it seems that Apple's practice is to allow its designers to maintain authority over the appearance of the products throughout the design process rather than relinquishing control to engineers or other specialists. I am informed that other witnesses will address this issue at trial, but I note it here for completeness.

67. To illustrate that ergonomic principles do not dictate any particular smartphone design, I will analyze the specific factors identified by Dr. Lehto as they pertain to various models of the iPhone and to the first-generation iPod touch. The various models of the iPhone and the first-generation iPod touch have been enormously successful, and that success has been achieved despite ergonomic principles, not because of them. Indeed, as described below, the application of conventional ergonomic principles suggests that various models of the iPhone and the first-generation iPod touch were ideally designed for only a small subset of the consumer population.[45]

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[42] Lehto Report at 5.

[43] Lehto Report at 6.

[44] Lehto Report at 6, *citing* Deposition of Daniele de Iuliis, on October 21, 2011, at 37:8–9, 36:18–39:10.

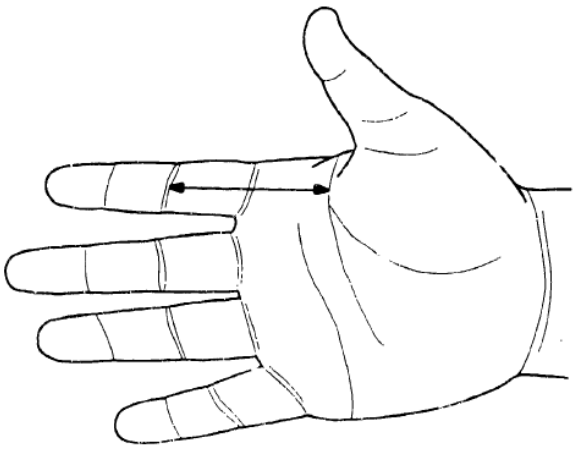
[45] *See* discussion *infra* ¶¶ 68–76.

This suggests to me that ergonomic considerations were far from the driving force in the design of the various iPhone models and the first-generation iPod touch.

c. Hand dimension

68. Dr. Lehto identifies various steps to consider in the ergonomic analysis for handheld electronic devices. He states: "The first step in analysis was to identify the basic proportions of a handheld electronic device that would provide the following functionality: 'Comfortably fit the human hand for users varying from a small woman to large man.'"[46] Although Dr. Lehto does not specify what he means by a "small woman" and a "large man," ergonomists typically understand these terms to refer to a 5th percentile woman and a 95th percentile man on that anthropometric dimension.

69. To estimate the size range for a handheld product, the appropriate anthropometric dimension that is used is the proximal phalanx link length (*i.e.*, the distance from the middle of the proximal interphalangeal joint of the index finger and the center of rotation of the metacarpo-phanlangeal joint, which is approximated by the transverse palm crease below the thumb, as illustrated in the following figure).



[46] Lehto Report at 11–12.

70. The anthropometric dimensions (in mm) for the relevant percentiles are given in the following table.[47]

Proximal Phalanx Link Length (mm)	5th percentile	50th percentile	95th percentile
Male	51.8	60.5	70.8
Female	48.7	56.0	66.2

71. The width of the original iPhone is 61.0 mm, which means that the products' width would optimally fit the hand of a 50th–55th percentile man and an 80th–85th percentile woman. The width of the iPhone 3G/3GS is 62.1 mm, which means that for comfort the product width would optimally fit the hand of a 55th percentile man and an 85th percentile woman. The width of the iPhone 4 is 58.6mm, which means that the product width would optimally fit the hand of a 35th percentile man and a 70th percentile woman. The width of the first-generation iPod touch is 61.8 mm, which means that the product width would optimally fit the hand of a 54th percentile man and an 84th percentile woman. Given the limited range of fit of these designs, they do not meet the anthropometric criterion for a comfortable fit to the human hand for a 5th percentile female to 95th percentile male range of users. Although this does not mean that these devices cannot be held in the hands of this wide range of users, for small hands these devices will be uncomfortably large and for large hands they will be uncomfortably small. Thus, ergonomic considerations do not appear to have dictated the designs of the various iPhone models or the first-generation iPod touch.

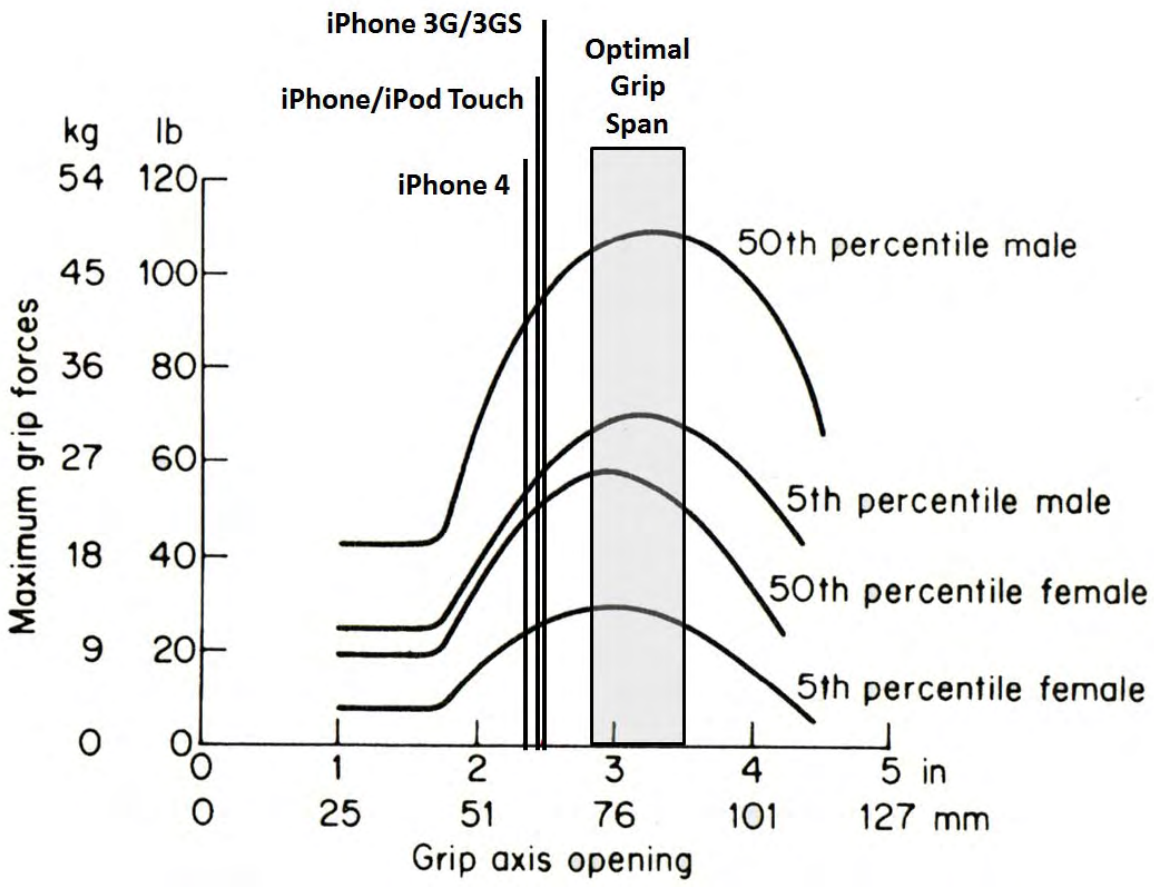
d. Hand grasp

72. Dr. Lehto also mentions that the iPhone can be held with a modified version of a Power Grip, termed an Oblique Power Grip. A Power Grip is the strongest grip that can be

[47] The data in this table is sourced from T.M. Greiner, *Hand Antropometry of US Army Personnel*, Technical Report, Natrick/TR-92/011 (1991).

generated by the hand and it represents 100% of the maximal grasping force. An Oblique Power Grip is a variant of the Power Grip that typically can generate only 65% of the strength of a Power Grip. Where possible, ergonomists recommend that handheld products should be designed to allow a Power Grip in preference to an Oblique Power Grip. The strength of both types of grips is significantly influenced by the grip span required to hold a product in the hand. When a product can be held with the strongest Power Grip, it is the most stable grasp on the product and it is unlikely that the product will be dropped. The weaker the grip, the greater the likelihood that the product will be unstable in the hand, and the greater the risk that it will be dropped. The relationship between grip span and grip strength is well understood and is shown in the following figure.[48]

[48] This figure is based on data from M.M. Sanders & E.J. McCormick, HUMAN FACTORS IN ENGINEERING & DESIGN 393 (7th ed. McGraw-Hill, NY 1993).



73. This figure shows the grip span (x axis) and grip strength (y axis) for 5th percentile and 50th percentile women and men. The optimal grip span is that which allows the maximum grip force to be generated, and this region is shown by the gray box. The widths of the iPhone, iPhone 3G/3GS, iPhone 4, and first-generation iPod touch are plotted and these fall below the optimal grip span by a considerable margin for both for 5th percentile and 50th percentile women and men. To meet ideal ergonomic design requirements, a phone should have an adjustable width that can accommodate a 5th percentile female to 95th percentile male hand.

74. This discrepancy between the widths of the iPhone, iPhone 3G/3GS, iPhone 4, and first-generation iPod touch and the optimal grip span for women and men undoubtedly accounts in part for the large secondary market that rapidly developed for iPhone and iPod touch covers that increase the phone size, improve the grasp strength and comfort of holding the phone, and

protect the phone against damage from being dropped. For example, Belkin sells the Belkin® Grip Ergo iPhone® 3G Silicone Case which has a textured overlay and offers an easy grip.[49]

Belkin® Grip Ergo iPhone® 3G Silicone

Amazon also sells the AmazonBasics Silicone Case for AT&T and Verizon iPhone 4 and iPhone 4S, which is specifically advertised as follows: "This silicone case for Apple's iPhone 4 offers a soft-touch rippled pattern for added comfort and improved grip."[50] In other words, the size and shape of the iPhone are not "functional" at all.

Silicone Case for AT&T and Verizon iPhone 4 and iPhone 4S

[49] This photo is from http://www.amazon.com/Belkin-Grip-Silicon-Sleeve-BLACK/dp/B002K8MB3Y/ref=pd_cp_e_2.

[50] This photo and quotation are from http://www.amazon.com/AmazonBasics-Silicone-Verizon-iPhone-Black/dp/B003Y74AZ2.

e. Phone length

75. Dr. Lehto also notes that "[t]he length of the iPhone 3G is about the same distance between the ear and mouth."[51] The distance from the tragus of the ear to the corner of the mouth varies with age and gender. For adults, the distance from the edge of the mouth to the tragus of ear ranges from 80 to 100 mm.[52] However, this dimension is not a recommended dimension for the ergonomic design of a phone. There is a recommended dimension for a handheld telephone handset and this specifies a distance of 146mm from the center of the earpiece to the center of the mouthpiece and that the mouthpiece is at 30 degrees to the ear piece.[53] Many handheld land-line phones conform to this recommendation. For mobile phones, the clamshell phone designs emerged to better accommodate this recommendation by increasing the distance between the mouthpiece and earpiece and by angling the mouthpiece relative to the earpiece when the two halves of the phone were opened along the short axis (width) of the phone. However, most smartphones do not meet this ergonomic guideline. This does not mean that the phones cannot be held and used, but rather that their designs are not optimally ergonomic, and thus not dictated by the functional requirements of ergonomics. Because the designs of the various iPhone models are not optimally ergonomic, I conclude that these designs were not dictated by function.

76. For the above reasons, it is my opinion that general principles of ergonomics and human factors do not dictate any one particular design for a smartphone or media player. Below, I address why the D'087, D'677, and D'270 patented designs specifically are not functional.[54]

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[51] Lehto Report at 10.

[52] *See* Emergency Department Intubation Checklist, *available at* http://emupdates.com/wp-content/uploads/2011/01/EDICTv121.pdf).

[53] *See* W.E. Woodson, B. Tillman & P. Tillman, HUMAN FACTORS DESIGN HANDBOOK 419 (2d ed., McGraw Hill Inc. 1992).

[54] *See* discussion *infra* Sections VIII.B.–D.

2. There are several ergonomically viable alternative smartphone designs available on the market.

77. Below I describe a number of smartphones that are or will be available on the market. All of these perform conventional smartphone functions, but they nevertheless have different form factors. This wide variety of commercially available products indicates that the functionality of a smartphone does not dictate any particular design. Indeed, if Dr. Lehto's position that ergonomic principles dictated the designs in the D'087, D'677, and D'270 Patents were true, all manufacturers would have converged upon these designs.

a. Alterative Smartphone Designs by Samsung

78. For example, the form factor of the Samsung Gem SCH-I100 (released in February 2011) is basically rectangular but with asymmetric curvature of the top and bottom.[55] Attached as Exhibit 22 are images of the Samsung Gem SCH-I100. The display takes up most of the user side of the phone, and it comprises a rectangular touch screen (68mm x 43mm) that is asymmetrically positioned between the top and bottom. The bottom of the phone consists of a curved lower section that has sharply curved corners to the body of the phone. The top of the phone consists of a more squared upper section that has sharply curved corners to the body of the phone. The lower section has a greater radius of curvature than the top of the phone. Five physical buttons are located beneath the touch screen.[56] A large "home" key, consisting of an irregular pentagonal push button, is centered between the edges of the lower section. Beneath this push button is a sweeping double-winged rocker switch that functions as the Menu key (left press) and Back key (right press), and to either side of this switch are arc-shaped push buttons that function as the Send key (left) and the End key (right). The Samsung website states that this smartphone is

[55] *See* http://www.samsung.com/us/mobile/cell-phones/SCH-I100ZKAXAR; http://www.gsmarena.com/samsung_i100_gem-3738.php.

[56] *See* http://www.samsung.com/us/mobile/cell-phones/SCH-I100ZKAXAR.

capable of making phone calls, sending and receiving emails, and a variety of other functions.[57] It also includes a 3.2Mp camera and runs the Android operating system. The integrated earpiece speaker is in the shape of an inverted irregular pentagon. There is a definite overall 'soft' look to this phone, with subtle curves running top to bottom, softer radii on all edges and corners, and a larger radius side to side at the top and bottom adding to a more visually pleasing and comfortable look than a simpler, harder, straight-edge rectangular form. The product dimensions are listed as 113mm x 55mm x 12mm, and the device weighs 109 grams.[58] Based on the width of this phone, it will have an optimal fit to the hand of a 15th percentile man and 45th percentile woman.[59] These optimal fit percentiles are different than those for the different models of the iPhone, indicating that ergonomic considerations do not dictate any single smartphone design.

Samsung Gem SCH-I100

79. As another example, the Samsung Gravity Touch SGH-T669 (released in June 2010) performs virtually the same functions as the Samsung Gem SCH-I100 but has a completely different form factor.[60] Attached as Exhibit 23 are images of the Samsung Gravity Touch SCH-T669. The display takes up most of the user side of the phone but it is smaller than that of the

[57] *See id.*

[58] *Id.*; *see also* http://www.gsmarena.com/samsung_i100_gem-3738.php.

[59] The issue of optimal fit also arises with respect to the length, shape, weight, and thickness of the device. I have used width as an example in this report because it can be readily measured and compared against standard ergonomic metrics.

[60] *See* http://www.gsmarena.com/samsung_t669_gravity_t-3336.php.

Samsung Gem SCH-I100, and it comprises a rectangular touch screen (57mm x 42mm) that is symmetrically positioned between the top and bottom. It has more heavily curved top and bottom portions that give this phone a much softer and more visually pleasing and comfortable appearance than a rectangular shape. The earpiece is in the top section and is a thick crescent shape, and there are two physical buttons below the touch screen: a central Menu push button and a U-shaped rocker switch with a Call key (left) and a Power key (right). A slide-out QWERTY keyboard that is the whole underside of the phone can be used instead of the touch screen. The product dimensions are listed as 110mm x 56.6mm x 15mm, and the device weighs 120 grams.[61] Based on the width of this phone, it will have an optimal fit to the hand of a 20th percentile man and 50th percentile woman. These optimal fit percentiles are different than those for the different models of the iPhone, indicating that ergonomic considerations do not dictate any single smartphone design.

Samsung Gravity Touch SGH-T669

80. The Samsung Beat DJ M7600 (released in May 2009) has a shape with semi-circular ends and no corners.[62] Attached as Exhibit 24 are images of the Samsung Beat DJ M7600. The display screen is 61mm x 40mm, and it is almost symmetrically centered on the body of the phone. In the top section, it has an asymmetrically placed camera and a curved

[61] *See* http://www.gsmarena.com/samsung_t669_gravity_t-3336.php.
[62] *See* http://www.gsmarena.com/samsung_m7600_beat_dj-2684.php.

speaker earpiece. In the bottom section, it has a curved three-way rocker switch to activate the phone and perform back and power functions. One variant of the model has a sliding face that reveals an alphanumeric keypad, the top section of which has beveled corners. This phone shows that no specific corner design is an essential functional element of phone design. The product dimensions for the M7600 are listed as 112mm x 51mm x 13.9 mm, and the device weighs 99.7 grams.[63] Based on the width of this phone, it has an optimal fit to the hand of a 40th percentile man and 70th percentile woman. These optimal fit percentiles are different than those for the different models of the iPhone, indicating that ergonomic considerations do not dictate any single smartphone design.

Samsung Beat DJ M7600

81. Samsung also appears poised to offer a clamshell touchscreen smartphone called the Samsung W999.[64] Attached as Exhibit 25 is a printout from the website GSM Arena displaying images of the device. It will reportedly perform all of the usual smartphone functions but has a completely different form factor, namely, it is a clamshell.[65] The top half of the phone consists of dual touchscreens (front and back) that take up most of the phone, and the bottom half

[63] *See* http://www.gsmarena.com/samsung_m7600_beat_dj-2684.php.
[64] *See* http://www.gsmarena.com/samsung_w999-4660.php.
[65] *See id.*

consists of physical buttons and a conventional alphanumeric phone pad.[66] The design will apparently allow the consumer to use the touchscreen both while the phone is open and while it is closed. The product dimensions are listed as 111mm x 59mm x 17.8mm, and the device weighs 206 grams.[67] Based on the width of this phone, it has an optimal fit to the hand of a 40th percentile man and 70th percentile woman. These optimal fit percentiles are different than those for the different models of the iPhone, indicating that ergonomic considerations do not dictate any single smartphone design.

Samsung W999

b. Alternative Smartphone Designs by Third Parties

82. Other companies have also introduced smartphones that have still more design variations, yet have similar or identical functionality. The Casio GzOne Commando 4550 (released in April 2011) is a ruggedized phone with additional protective bumpers.[68] Attached as Exhibit 26 are images of the Casio GzOne Commando 4550. It has a large, centered display (77mm x 46mm), there are no buttons on the front face of the phone, and the touch screen is recessed in the casing. The ends of the phone are arched. The product dimensions for the GzOne Commando 4550 are listed as 129mm x 65.5mmm x 15.2 mm, and the device weighs 154

[66] *See id.*
[67] *See id.*
[68] *See* http://www.gsmarena.com/casio_g'zone_commando-4550.php.

grams.[69] Based on the width of this phone, it will have an optimal fit to the hand of an 80th percentile man and 90th percentile woman. These optimal fit percentiles are different than those for the different models of the iPhone, indicating that ergonomic considerations do not dictate any single smartphone design.

Casio GzOne
Commando 4550

83. The Sony Ericsson Xperia Arc S (released in September 2011) is a large touchscreen phone (93mm x 6mm).[70] Attached as Exhibit 27 are images of the Sony Ericsson Xperia Arc S. It has a rectangular shape with shallow curves on the top and bottom, and it also has a hard casing with angular corners with very small radiuses. It has three curvilinear buttons—Back, Home, and Menu—beneath the smooth glass surface. The product dimensions for the Arc S are listed as 125mm x 63mm x 8.7mm, and the device weighs 117 grams.[71] Based on the width of this phone, it will have an optimal fit to the hand of a 65th percentile man and 88th percentile woman. These optimal fit percentiles are different than those for the different models of the iPhone, indicating that ergonomic considerations do not dictate any single smartphone design.

[69] *See id.*
[70] *See* http://www.gsmarena.com/sony_ericsson_xperia_arc_s-4134.php.
[71] *See id.*

Sony Ericsson Xperia Arc S

84. The Nokia Lumia 800 (released in November 2011) is a rectangular phone that has nearly 90 degree corners when viewed from the front.[72] Attached as Exhibit 28 are images of the Nokia Lumia 800. This contradicts Dr. Lehto's argument that rounded corners are a functional requirement for a smartphone. The large display (76mm x 55mm) is centered on the phone and it is inserted into a metal body with edges that can be felt. All buttons are placed at the right side of the phone. The product dimensions for the Nokia Lumia 800 are listed as 116.5mm x 61.2mm x 12.1mm, and the device weighs 142 grams.[73] Based on the width of this phone, it will have an optimal fit to the hand of a 55th percentile man and 82nd percentile woman. These optimal fit percentiles are different than those for the different models of the iPhone, indicating that ergonomic considerations do not dictate any single smartphone design.

[72] *See* http://www.gsmarena.com/nokia_lumia_800-4240.php.
[73] *See id.*

Nokia Lumia 800

85. The Pantech Crossover P8000 (aka Pantech Moon; released in June 2011) has acute "angled" rather than rounded corners.[74] Attached as Exhibit 29 are images of the Pantech Crossover P8000. There is a flat clear surface covering much of the front of the product and the phone has distinctive trapezoidal arrangements above and below the display screen. The top section of the phone has buttons at the corners—Function in the left corner, Lock/Power in the right corner. The earpiece is an irregular quadrilateral that is centrally positioned. The display takes up most of the user side of the phone, and it comprises a rectangular touch screen (65mm x 43mm) that is subtly asymmetrically positioned between the top and bottom. The bottom section is identically shaped to the earpiece but inverted and it has a centrally positioned menu key and home key rocker switch. The whole underside of the Crossover is also a slide-out QWERTY keyboard. The product dimensions are listed as 113mm x 58mm x 14mm and it weighs 146 grams.[75] Based on the width of this phone, it will have an optimal fit to the hand of a 25th percentile man and 55th percentile woman. These optimal fit percentiles are different than those for the different models of the iPhone, indicating that ergonomic considerations do not dictate any single smartphone design.

[74] *See* http://www.phonearena.com/phones/Pantech-Crossover_id5598.
[75] *See id.*

Pantech Crossover P8000

86. The Nokia X5 (released in September 2010) is almost a perfectly square phone with sharply angled corners.[76] Attached as Exhibit 30 are images of the Nokia X5. This design illustrates that Dr. Lehto's assertion that a smartphone needs a rectangular shape with rounded corners to be functional is untrue. This phone has a small display (36mm x 48mm) that is centered in the body of the phone. Beneath this are two buttons, one inserted within the other and an earpiece is located centrally in the top section. The top of the phone slide to reveal a QWERTY keypad. The product dimensions are listed as 74.3mm x 66.4mm x 16.9mm and it weighs 129 grams.[77] Based on the width of this phone, it will have an optimal fit to the hand of an 85th percentile man and 95th percentile woman. These optimal fit percentiles are different than those for the various models of the iPhone, indicating that ergonomic considerations do not dictate any single smartphone design.

Nokia X5

[76] *See* http://www.gsmarena.com/nokia_x5_01-3396.php.
[77] *See id.*

87. All of the above phones illustrate that the design of a smartphone is not dictated by the functionality of the phone. These examples further illustrate that specific elements of a smartphone's design—such as the nature of the phone surface or the design of any corners—are not dictated by the functionality of the device.

B. The D'087 Patented Design Is Not Dictated by Function

1. The overall design is not functional based on the principles of ergonomics and human factors.

88. As set forth above, the D'087 Patent sets forth aspects of a specific design of a smartphone. As set out in Section V.A., my understanding is that the standard for functionality is stringent—*i.e.*, whether a design is "dictated" by the use or purpose of the article. In my opinion, the overall design set forth in D'087 is not functional based on the principles of ergonomics and human factors.

89. Though Dr. Lehto identifies what I understand to be the proper standard at the beginning of his report in Section IV.A., he does not actually apply this standard in his analysis (Sections IV.B.-H.). Rather, he seems to conflate the concepts of (1) having a function and (2) being dictated by function. As an example, he seems to state that because any small rectangular shape can be held in the human hand, it follows that this shape has certain functional advantages, and from that he seems to conclude that a rectangular shape is dictated by function. I disagree, as many other shapes of small-sized objects can equally well be held in the human hand. Indeed, ergonomic design guidelines teach that a handheld product should be shaped to comfortably fit the hand and hence a simple rectangular shape is not an optimal design.[78] Thus, I believe Dr. Lehto's analysis misses the point and sets the "dictated by function" bar far too low.

[78] Alan Hedge, *Design of Hand-Operated Devices, in* Human Factors in Consumer Products 203, 203–222 (N. Stanton ed., 1998).

90. The principal ergonomic requirement for a handheld mobile device is that it is capable of being safely held in a human hand. This is an issue of object size and is not driven by object shape (assuming that the design meets the minimum safety requirements for its intended use). Beyond that, myriad design choices determine the exact shape and appearance of the device. While ergonomic considerations may influence the design process to some extent, they do not dictate any specific form factor. Instead, the final design is the result of various trade-offs between aesthetic considerations and feature-related priorities.

91. A handheld mobile device such as a smartphone need not be rectangular with evenly rounded corners and a completely flat, smooth face in order to satisfy ergonomic requirements. The base shape could be rounded, oval, square, or cylindrical, not rectangular, and still fit comfortably in one's hand. The corners could also be squared, not rounded, and all four corners need not have the same radial curvature. Corners can even be eliminated from the design altogether by rounding the ends of the device without affecting functionality. Any number of departures from the patented design could still achieve the same functions commonly present in smartphones. The variety of smartphone designs on the market highlights this fact.

92. Similarly, if the design of electronic devices were dictated by the need to house internal components or the need to display information in rows and columns, as Dr. Lehto suggests,[79] then all smartphones would be rectangular. As the discussion above shows, this is not the case.[80]

93. Moreover, as demonstrated above, there are many alternative designs for smartphones that all have the same level of functionality. This analysis is not difficult in that it does not require one to imagine or create different designs that could have the same functionality. Here, it only requires a review of some of the smartphones offered by a few of the major

[79] Lehto Report at 6-7.
[80] *See* discussion *supra* ¶¶ 77–87.

manufacturers, such as Samsung. Dr. Lehto's analysis fails to consider these alternatives in detail, rendering his analysis incomplete and erroneous. In evaluating alternatives, I considered whether alternative designs could perform the same function, not whether the alternative offered an identical set of benefits.

94. Significantly, the large secondary market for iPhone-related accessories indicates that the iPhone itself is not the pinnacle of ergonomic design for some consumers. There are numerous third-party accessories such as cases that aim to supplement or alter the physical design of the iPhone, or to protect it from damage. When placed on the phone, some of these cases render the device easier or more comfortable for some people to hold, suggesting that the iPhone's design was not dictated by the ergonomic goals of optimal comfort or ease of grip.

95. In my opinion, the design depicted in the D'087 Patent is not dictated by the purpose or use of a smartphone.

2. The individual elements in the D'087 patented design are not dictated by function based on the principles of ergonomics and human factors.

96. Based on my understanding of the functionality analysis in design patent law, Dr. Lehto's piecemeal approach to the alleged functionality of individual design elements is improper. Dr. Lehto separates the D'087 patent into a list of broadly defined elements and then summarily opines that each of these elements in isolation are functional.[81] My understanding is that this type of piecemeal analysis is incorrect, as a proper functionality analysis looks at the patented design as a whole.[82] Nonetheless, for the sake of completeness, I address the individual elements of the D'087 design discussed by Dr. Lehto.

[81] *See* Lehto Report at 9.
[82] *See* discussion *supra* ¶¶ 77–87.

97. Dr. Lehto states that the overall "rectangular shape" of the D'087 design is "functional."[83] For the reasons set forth above, ergonomics does not dictate the specific design of the D'087 patent, a fact again made clear by the many different designs of smartphones available on the market. As those many designs demonstrate, there are a variety of form factors that can and are used for smartphones. There are designs that are rectangular with rounded edges of different radiuses, rectangular with squared edges, oval shapes with differing degrees of curvature, square shapes, slider phones with QWERTY keyboards that slide out from beneath a touch screen, and clamshell forms, among others. In my opinion, ergonomic principles do not dictate any specific form factor, and, indeed, different smartphone designers have utilized different form factors.

98. The fact that rectangular shapes are "used in most [electronic] devices"[84] does not mean that the choice of a rectangular shape is driven by ergonomic considerations, that other shapes are ergonomically unsound, or that other forms factors cannot be used. As the diversity of form factors on the market demonstrates, there are a variety of shapes that satisfy the minimal ergonomic requirement that the size of the phone can be held in the hand.[85] I note that Dr. Lehto does not present a detailed analysis of any of the many different form factors on the market.[86]

99. Dr. Lehto also asserts that the "smooth top surface, rounded edges, and rounded corners in the D'087 design is [sic] functional."[87] Because these design features are not mandated

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[83] Lehto Report at 9.

[84] Lehto Report at 6.

[85] Dr. Lehto suggests that many consumer electronics devices are rectangular because there are key pads or keyboards. *See* Lehto Report at 7. As set forth above, smartphones utilize a variety of form factors notwithstanding the fact that many have key pads, keyboards, or both. It is worth noting that this variety of non-rectangular form factors occurs in other handheld electronic devices with key pads and/or keyboards. For example, TiVo's DVR remote controls, which it touts as "ergonomic," are peanut-shaped. *See* https://www3.tivo.com/store/accessories-remote.do.

[86] *See* Lehto Report at 30–31.

[87] Lehto Report at 9.

by ergonomic factors, I disagree that they are functional on that basis. Ergonomic design does recommend that a design should not have sharp corners that could lacerate the skin or cause uncomfortable compression, but a variety of design alternatives can satisfy this recommendation, such as the use of softer materials, protective covers, and many different corner radiuses that can be two- or three-dimensional. Again, the multitude of smartphones on the market demonstrates that ergonomic considerations do not mandate any particular corner design and this applies to these elements as well.

100. There are smartphones in the marketplace with rounded corners (both small and large radius corners), squared corners, angled corners, and no corners. The spectrum of available options is far more varied than the dichotomy of sharp vs. rounded that Dr. Lehto appears to suggest. Indeed, Dr. Lehto oversimplifies the design process by suggesting that designers must round their corners in order to "[e]liminat[e] sharp corners" and thus adhere to a "standard approach followed in safety engineering and ergonomics for eliminating hazards and discomfort by reducing force concentrations at the location where objects contact the body."[88] Smartphone designers can incorporate ergonomically acceptable corners that are squared or angled, or they can round the entire end of the smartphone to eliminate "corners" altogether. Dr. Lehto also states that the use of rounded edges and corners "reduce[] the chance the person will fumble and drop the device or otherwise damage the product."[89] Significantly, the large secondary market for iPhone cases to protect the iPhone from damage when dropped suggests that the rounding of the iPhone corners did not allow Apple to create a phone that was very difficult to drop accidentally.

101. In Dr. Lehto's report, there is considerable discussion of rounded corners being functional. All of this discussion focuses on the potential safety benefits of rounded versus square corners. However, there are many ways to protect the corners of a product and square

[88] Lehto Report at 8.
[89] Lehto Report at 8.

corners can be covered with flexible material, such as rubber, or harder material, such as a plastic bumper. A corner can be rounded along two dimensions (front to back, as in the Lumia 800, or along the side, as in the iPhone 4) or along three dimensions (as in the original iPhone). Indeed, the primary reason for having rounded corners is for aesthetic design reasons rather than functionality.

102. There are also smartphones with flat or contoured fronts and smartphones with rounded edges (both small and large radius edges), squared edges, and angled edges.

103. As to a "smooth top surface,"[90] there are no ergonomic requirements that would dictate such a form. A smartphone could have a raised or sunken screen, which would help differentiate touch-sensitive parts of screen from other parts of front face. Even if a smooth surface were somehow deemed necessary to use the touch-sensitive portion of the phone, this consideration would not require that the entire front face of the device be smooth. A designer could frame the surface with plastic, include a variety of buttons, or incorporate a keyboard above, below, or adjacent to the screen as shown by some of the phones illustrated in this report.[91] Those alternative design features would not interfere with the user's unimpeded view of and access to the touch-sensitive parts of the screen. Indeed, many of the iPhone covers available on the secondary market simulate the addition of such features. Moreover, Dr. Lehto's assertion that a smooth flat surface "eliminates clutter" is precisely an ornamental or aesthetic goal, not a functional one.[92] In reality, each function still requires a button, but because electronic softkeys can be hidden beneath a smooth surface, this design gives the illusion of eliminating clutter, which is an ornamental goal. These design options do not change the functions of a smartphone.

[90] Lehto Report at 9.
[91] *See* discussion *supra* ¶¶ 77–87.
[92] Lehto Report at 8.

104. Though Dr. Lehto includes a heading titled "Thin Rectangular Device with Rounded Corners," the subsequent analysis addresses the alleged "functionality" of "rounded corners and a thin rectangular shape or form factor" of the D'087 patented design.[93] I have already addressed the flaws in Dr. Lehto's analysis regarding these design elements above.

105. Dr. Lehto also asserts that the "centered rectangular display area" in the D'087 patented design is "functional" because it "offer[s] a clear and unimpeded view of the entire viewing surface when gripped using an Oblique Power Grip" and this specific "form factor of the claimed design is particularly important" to allowing the device to be held in a hook grip."[94] As discussed above, however, the D'087 patented design, as embodied in the original iPhone, iPhone 3G, and iPhone 3GS, is not the optimal design in terms of hand grasp considerations from an ergonomic perspective.[95]

106. Dr. Lehto also concludes that "a design placing a horizontally centered receiver aperture or hole near the top of the device is crucial to the function of an electronic communication device."[96] Though Dr. Lehto alleges that there may be ergonomic reasons for placing the speaker centered near the top of the device, he offers no explanation for why ergonomics would dictate the particular shape of the speaker slot. Indeed, the rounded, oval shape of the feature is purely ornamental from an ergonomics perspective; the speaker could have a rectangular, square, circular, diamond, trapezoidal, or other shape instead and still perform its function as a speaker. Nor does Dr. Lehto consider the possibility that a smartphone design could incorporate multiple speaker slots, which could enhance the function of the device ergonomically.

107. Moreover, different companies may target different audiences, and those audiences may have different preferences regarding the ease of some functions (*e.g.*, typing) over other

[93] Lehto Report at 11.
[94] Lehto Report at 17.
[95] *See* discussion *supra* ¶¶ 68–76.
[96] Lehto Report at 18.

functions (*e.g.*, taking photographs), which may result in design trade-offs that impact the form factors the designer considers and ultimately adopts.[97]

108. For all of these reasons, the individual elements described by Dr. Lehto in his analysis of the D'087 Patent are not dictated by the purpose or use of a smartphone or other electronic device.

C. The D'677 Patented Design Is Not Dictated by Function

1. The overall design is not functional based on the principles of ergonomics and human factors.

109. As set forth above, the D'677 patent sets forth aspects of a specific design of a smartphone. As set out in Section V.A, my understanding is that the standard for functionality is stringent—*i.e.*, whether a design is "dictated" by the use or purpose of the article. In my opinion, the overall design set forth in the D'677 patent is not functional based on the principles of ergonomics and human factors.

110. As with his analysis of the D'087 Patent, Dr. Lehto does not apply the proper standard in his analysis of the functionality of the D'677 Patent. As explained above, he seems to conflate the concepts of (1) having a function and (2) being dictated by function.

111. In analyzing the D'677 Patent, Dr. Lehto concludes that the "smooth flat top surface and rectangular viewing area in the D'677 design are functional for all the reasons set forth above" for the D'889 and D'087 patents.[98] As discussed above, Dr. Lehto seems to assume that the rectangular shape of the design is dictated by function without considering that

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[97] *See* discussion *supra* ¶¶ 57, 62, 90. Dr. Lehto asserts that the Asserted Design Patents and the asserted trade dress and trademarks are functional because they "[a]ccomodate multiple forms and stages of use." Lehto Report at 39. The availability of a broad range of smartphone designs indicates that different smartphone manufacturers have optimized their designs for different uses. Thus some smartphones are better designed than others for browsing the internet, typing messages, viewing videos, or making calls.

[98] Lehto Report at 19.

ergonomic principles actually teach that other shapes would work equally well if not better.[99] For the same reasons explained above, the overall design of the D'677 Patent is not dictated by function.

2. The individual elements in the D'677 patented design are not dictated by function based on the principles of ergonomics and human factors.

112. Based on my understanding of the functionality analysis in design patent law, Dr. Lehto's piecemeal approach to the alleged functionality of individual design elements is improper. Dr. Lehto identifies one additional element in the D'677 Patent not present in the D'889 and D'087 Patents, namely "a single uniform color such as black for the top of the device' [sic]."[100] Though I am informed that Dr. Lehto's piecemeal functionality analysis is incorrect, for the sake of completeness, I address this additional individual element discussed by Dr. Lehto.

113. Dr. Lehto asserts that "[t]he use of a single uniform color such as black for the top of the device' [sic] plays a functional role" because it "provides an easily perceived way for users to tell when the device is active or inactive."[101] This same goal could be achieved through various other designs. For example, the borders above and below the display area could use a color that contrasts with the color of the inactive screen, as they do on the Sony Ericsson Xperia Arc S, the Nokia Lumia 800, and the Nokia X5.[102] These alternative designs readily signal the active/inactive status of the device just as clearly as the design in the D'677 patent. Therefore, it is my opinion that principles of ergonomics and human factors do not dictate that the entire top surface of the device be black.

114. Dr. Lehto also asserts "[a] black background, when the display is inactive, . . . adds to functionality by maximizing the potential contrast attainably when display pixels are

[99] *See* discussion *supra* ¶¶ 89, 91–92 & *infra* ¶ 118, 150–152, 180, 187.
[100] Lehto Report at 19.
[101] Lehto Report at 19.
[102] *See* discussion *supra* ¶¶ 83–84, 86.

activated."[103] Ergonomic principles do not dictate that a black background is the optimal ergonomic design for a device with a display screen. In fact, they teach the opposite. Ergonomic principles recommend that computer input devices should have reflectances less than 45%;[104] this also applies to screen bezels[105] with recommended reflective values in the 25%-45% range.[106] In the past, many computer products had neutral gray or cream colors to meet this recommendation. However, experimental research has found no difference in the effects of a white or black bezel on office task performance or on visual behavior.[107] Experimental research comparing black and silver matte and glossy bezels finds that bezel color and glossiness do not appear to affect visual performance, but user acceptability is affected, and of the designs compared, acceptability ratings were lowest for a glossy black bezel.[108] Black bezels, especially when glossy, can be the least desirable design from an ergonomic standpoint.

115. For all of these reasons, the individual elements described by Dr. Lehto in his analysis of the D'677 Patent are not dictated by the purpose or use of a smartphone or other electronic device.

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[103] Lehto Report at 19.

[104] *See* ANSI/HFES 100-2007, HUMAN FACTORS ENGINEERING OF COMPUTER WORKSTATIONS, Human Factors and Ergonomics Society, Santa Monica, CA.

[105] In this paragraph, I use the term "bezel" to refer to the frame or casing that surrounds a display area, such as the frame around a computer monitor. I understand, however, that Apple uses the term "bezel" in this proceeding to refer to the stainless steel material that surrounds the front face of the original iPhone, iPhone 3G, and iPhone 3GS devices.

[106] *See* M.M. Sanders & E.J. McCormick, HUMAN FACTORS IN ENGINEERING AND DESIGN 533 (7th ed. McGraw-Hill, NY1993).

[107] *See, e.g.*, C.M. Hunter, P.R. Boyce & J.H. Watt, *Effect of Bezel Reflectance on People Using a Computer Monitor*, *in* 3 HUMAN-CENTERED COMPUTING: COGNITIVE, SOCIAL, AND ERGONOMIC ASPECTS 58, 58–62 (Don Harris, Vincent Duffy, Michael Smith, Constantine Stephanidis eds., Lawrence Erlbaum Associates Inc. 2003).

[108] P.A. Howarth & S.G. Hodder, *Bezel Gloss and Glare*, 25 DISPLAYS 77, 87.

D. The D'270 Patented Design Is Not Dictated by Function

1. The overall design is not functional based on the principles of ergonomics and human factors.

116. As set forth above, the D'270 patent sets forth a specific design of an electronic device. As set out in Section V.A, my understanding is that the standard for functionality is stringent—*i.e.*, whether a design is "dictated" by the use or purpose of the article. In my opinion, the overall design set forth in the D'270 patent is not functional based on the principles of ergonomics and human factors.

117. As with his analysis of the D'087 and D'677 Patents, Dr. Lehto does not apply the proper standard in his analysis of the functionality of the D'270 Patent. As explained above, he seems to conflate the concepts of (1) having a function and (2) being dictated by function.

118. In analyzing the D'270 Patent, Dr. Lehto concludes that the "thin, rectangular shape and form factor with rounded corners, smooth flat top surface, and rectangular viewing area is [sic] functional for all the reasons set forth above" for the D'889, D'087, and D'677 Patents.[109] As discussed above, Dr. Lehto seems to assume that the rectangular shape of the design is dictated by function without considering that ergonomic principles actually teach that other shapes would work equally well if not better.[110] For the same reasons explained above, the overall design of the D'270 Patent is not dictated by function.[111]

2. The individual elements in the D'270 patented design are not dictated by function based on the principles of ergonomics and human factors.

119. Based on my understanding of the functionality analysis in design patent law, Dr. Lehto's piecemeal approach to the alleged functionality of individual design elements is improper. Dr. Lehto identifies one additional element in the D'270 Patent not present in the

[109] Lehto Report at 20.
[110] *See* discussion *supra* ¶¶ 89, 91–92, 111 & *infra* ¶¶ 150–152, 180, 187.
[111] *See* discussion *supra* Section VIII.B.–C.

D'889, D'087, and D'677 Patents, namely "a small rectangular area on the upper left in Figures 2 and 4 of the patent."[112] Dr. Lehto states that the iPod touch, which embodies the D'270 design, "has such as rectangular element to cover the antennae, which provides functionality related to receiving and sending signals."[113] Dr. Lehto does not state that this "rectangular element" is dictated by function, nor does he tie this feature to any principle of ergonomics or human factors. In my opinion, the presence of this rectangular design element on the back of the design depicted in the D'270 Patent is not dictated by any principle of ergonomics or human factors.

IX. THE DESIGN IN THE D'889 PATENT IS NOT DICTATED BY PRINCIPLES OF ERGONOMICS AND HUMAN FACTORS

A. The Principles of Ergonomics and Human Factors Do Not Dictate Any Particular Design for a Tablet Computer

120. As detailed below, in my opinion, considerations of ergonomics and human factors do not compel a particular design for a tablet computer. Rather, principles of ergonomics are guidelines that allow for substantial design variations for devices that provide the same functionality. It is my understanding that tablets, such as the iPad 2, can be used for video chatting, sending and receiving emails, surfing the internet, running applications, playing games, watching video content, reading e-books, and listening to music, among other things. In my opinion, the variety of different tablets on the market confirms that ergonomic principles impose minimal restrictions on the design choices available to tablet designers and do not dictate any particular tablet design, let alone the specific design set forth in the D'889 Patent.

121. Much as with smartphones, the various functions performed by a tablet highlight the significance of design trade-offs. Certain designs may be advantageous for certain functions but disadvantageous for other functions. For example, a tablet with a larger display screen may facilitate easier viewing, but a larger device may fit less comfortably in smaller hands or be less

[112] Lehto Report at 20.
[113] Lehto Report at 20–21.

comfortable to hold. I have personally examined a number of samples of different tablets. Based on this review, it is clear to me that there are a large number of tablets with acceptable ergonomic designs that have a wide variety of form factors in light of the goals that these devices are intended to achieve.

1. Dr. Lehto has not identified ergonomic principles that would dictate a particular tablet design.

122. As in his analysis of the other design patents, Dr. Lehto has not pointed to any guidelines or principles that support his position that the D'889 patented design is dictated by the purpose or use of a tablet computer.

a. Apple iOS Human Interface Guidelines

123. As discussed above, nothing in the "Apple iOS Human Interface Guidelines" suggests that they had any impact on the physical design of the iPad 2 or the D'889 Patent.[114]

b. Apple's design process

124. I understand that Apple's practice is to allow its designers to maintain authority over the appearance of the products throughout the design process rather than relinquishing control to engineers or other specialists.[115]

c. Voluntary ergonomic standards

125. In the United States, the voluntary ergonomic design standard for computer products and workstations describes the active touch area of tablets as "flat, slate-like panels that can be used for cursor movement and object selection tasks."[116] There is no specific shape that is specified for a tablet. In fact, there are no mandatory ergonomic design requirements for a tablet

[114] *See* discussion *supra* ¶ 64 & *infra* ¶¶ 161, 174.
[115] *See* discussion *supra* ¶¶ 65–66.
[116] ANSI/HFES 100-2007, HUMAN FACTORS ENGINEERING OF COMPUTER WORKSTATIONS, Human Factors and Ergonomics Society, Santa Monica, CA.

in this standard. There is one generic recommendation: "The active area of a tablet or touch-sensitive surface should . . . [b]e flat, smooth, and free from warping or surface imperfections."[117]

2. There are several ergonomically viable alternative tablet designs available on the market.

126. The Sony Tablet S is a tablet computer with a 9.4" touchscreen. It is 9.5"L x 6.8"W x 0.3"D and weighs 1 lb. 5 oz. Attached as Exhibit 31 are images of the Sony Tablet S. The device does not have a flat, rectangular form factor; rather, it has a "folded" design. Commentators have praised the this device's "[c]omfortable, ergonomic design,"[118] noting that "[i]ts unique wedge shape gives it a futuristic look and provides improved balance in your hand compared with the flat competition"[119] and that when "placed on a table, the screen's forward slant minimizes glare and makes it more comfortable to type."[120] Sony's website describes the product as "[e]rgonomically designed," noting that the "ergonomic, wedge-shaped form shifts weight closer to the side, making it feel ultra light in one hand" and that "[i]t also makes for a perfect typing angle when set on a table."[121]

Sony Tablet S

[117] *Id.*

[118] Sascha Segan, "Sony Tablet S," PCMag, Dec. 5, 2011, http://www.pcmag.com/article2/0,2817,2397089,00.asp (APLNDC-Y0000233713- APLNDC-Y0000233714).

[119] CNET, "Sony Tablet S," http://reviews.cnet.com/tablets/sony-tablet-s-32gb/4505-3126_7-35003724.html#reviewPage1 (APLNDC-Y0000233702–233712).

[120] *Id.*

[121] http://discover.store.sony.com/tablet/#design/ergonomics.

127. The Barnes & Noble Nook Color is a tablet computer with a 7" touchscreen. It is 8.1"L x 5.0"W x 0.48"D and weighs 15.8 oz.[122] Attached as Exhibit 32 are images of the Barnes & Noble Nook. The device does not have a flat, clear surface on the front of the product. Instead, the device includes a gray opaque casing that frames the display area on the device. One reviewer observed that "[t]he Nook Tablet does feel a little better in your hand, largely because the border around the screen has a textured finish whereas the [other tablet] has a glossy, clear plastic border."[123] The Nook tablet does not have evenly rounded corners, as one corner of the device features a distinctive "loop" design. One reviewer stated that this loop design "serves as both a handle and a way to conceal the reader's MicroSD card slot."[124]

Barnes & Noble Nook

128. The Coby Kyros MID8125 is a tablet computer with an 8" touchscreen. It is 8.11"L x 6.22"W x 0.55"D and weighs 1.18 lb.[125] Attached as Exhibit 33 are images of the Coby Kyros MID8125 tablet. The device includes a casing that frames the display area such that it

[122] http://www.barnesandnoble.com/p/nook-color-barnes-noble/1100437663.

[123] CNET, "Barnes & Noble Nook Tablet," http://reviews.cnet.com/tablets/barnes-noble-nook-tablet/4505-3126_7-35059751.html#reviewPage1.

[124] Sascha Segan, "Barnes & Noble Nook Tablet Review," Nov. 18, 2011, PCMag, http://www.pcmag.com/article2/0,2817,2396554,00.asp (APLNDC-Y0000233669–233670).

[125] http://www.cobyusa.com/?p=prod&prod_num_id=10581&pcat_id=3001.

does not have a flat clear surface on the front of the product. This casing is comprised of an opaque plastic housing.

Coby Kyros
MID8125

129. The Acer Iconia A500 is a tablet computer with a 10.1" touchscreen. It is 10.2"L x 7.0"W x 0.5"D and weighs 1.7 lb.[126] Attached as Exhibit 34 are images of the Acer Iconia A500 tablet. This device does not have a flat clear surface on the front of the product. Instead, the vertical sides of the device include an opaque aluminum casing that wraps from the back to the front of the device. This casing consists of a different material than the other parts of the front screen of the device.

Acer Iconia
A500

[126] http://acer.us/ac/en/US/content/iconia-tab-a500.

130. The Sony Tablet P is a tablet computer with a dual 5.5" touchscreen. When open, the device is 6.22"L x 7.08"W x 0.53"D and weighs 0.82lb.[127] Attached as Exhibit 35 are images of the Sony Tablet P. This device consists of two rectangular screens that fold over in a clamshell-like format.

Sony Tablet P

131. The Panasonic Toughbook H2 is a ruggedized tablet computer with a 10.1" screen. It is 10.8"L x 10.6"W x 2.3"D and weighs 3.5 lb.[128] Attached as Exhibit 36 are images of the Panasonic Toughbook H2. This device is described by the manufacturer as having "superior ergonomics."[129] It has a rectangular display area inside an outer border that has an irregular shape and incorporates a large carry handle and a panel of external buttons.

Panasonic Toughbook H2

[127] http://discover.store.sony.com/tablet/tablet_p/index.html#intro.
[128] *See* ftp://ftp.panasonic.com/pub/Panasonic/toughbook/specsheets/TB-H2_ss.pdf.
[129] *Id.*

132. The Panasonic Toughpad A1 is a ruggedized tablet computer with a 10.1" touchscreen. It is 10.5"L x 8.4"W x 0.7"D and weighs 2.1 lb.[130] Attached as Exhibit 37 are images of the Panasonic Toughbook. This device has a rectangular display area inside an outer border that has an irregular shape.

Panasonic Toughpad A1

133. The Panasonic Toughbook U1 is a ruggedized tablet computer with a 5.6" screen. It is 5.9"L x 7.2"W x 2.2"D and weighs 2.3 lb.[131] Attached as Exhibit 38 are images of the Panasonic Toughbook U1. This device has a rectangular display area inside an outer border that has an irregular shape and incorporates a physical keyboard as well as various function buttons.

Panasonic Toughbook U1

[130] *See* ftp://ftp.panasonic.com/pub/Panasonic/business/toughpad/downloads/Toughpad_A1_Spec_Sheet.pdf.

[131] *See* http://www.panasonic.com/business/toughbook/ultra-mobile-rugged-toughbook-u1-ultra.asp; ftp://ftp.panasonic.com/pub/Panasonic/toughbook/specsheets/TB-U1-Ultra_ss.pdf.

134. The Juniper Mesa is a ruggedized tablet computer with a 5.7" screen. It is 7.9"L x 5.3"W x 2.0"D and weighs 1.9 lb.[132] Attached as Exhibit 39 is a brochure for the Juniper Mesa. This device has a rectangular display area inside an outer border that has an irregular shape and incorporates various physical function buttons.

Juniper Mesa

135. The Armor X10gx is a ruggedized tablet computer with a 5.7" screen. It is 11.4"L x 8.6"W x 1.8"D and weighs 4.7 lbs.[133] Attached as Exhibit 40 is a brochure for the Armor X10gx. This device has a rectangular display area inside an outer border that has an irregular shape and incorporates various physical function buttons. It also has a detachable carrying handle.

Armor X10gx

[132] http://www.junipersys.com/Juniper-Systems/products/Mesa-Rugged-Notepad/Specifications.

[133] http://www.drsarmor.com/pdf/ARMOR_X10gx.pdf; *see also* http://www.ruggednotebooks.com/drs-armor-x10gx-fully-rugged-tablet.

136. The Intel Studybook is a tablet for students with a 7" screen.[134] It weighs about 1.2 lbs.[135] This device has a rectangular display area inside what is described as "an easy-to-grip plastic shell."[136]

Intel Studybook

137. Motion offers a line of tablets for healthcare professionals.[137] The Motion C5v is a tablet with a 10.4" screen. It is 10.0"L x 10.0"W x 0.95"D and weighs 3.3 lbs.[138] Attached as Exhibit 41 are images of the Motion C5v tablet. This device incorporates a molded handle and is described as "ergonomic."[139]

Motion C5v

[134] *See* http://news.cnet.com/8301-17938_105-57413096-1/intel-studybook-tablet-designed-for-molding-young-minds/.

[135] *See* http://news.cnet.com/8301-17938_105-57413096-1/intel-studybook-tablet-designed-for-molding-young-minds/. This image in Paragraph 36 is available at http://www.ubergizmo.com/2012/04/intel-studybook/.

[136] http://gizmodo.com/5900658/intels-studybook-hands+on-the-indestructible-education-tablet-for-students.

[137] *See* http://www.motioncomputing.com/products/tablet_pc_c5.asp.

[138] http://www.motioncomputing.com/resources/C5_spec_sheet_US.pdf.

[139] *See id.*; *see also* http://www.motioncomputing.com/choose/spec_ergo_c5.htm.

138. Philips and Intel have launched a joint product, the Philips Mobile Clinical Assistant ("MCA") for healthcare professionals.[140] The Philips MCA is a tablet with a 10.4" screen.[141] Attached as Exhibit 42 are images of the Philips MCA tablet. This device incorporates a stand that also assists with gripping the device.

Philips MCA

139. The Panasonic Toughbook H1 MCA is a tablet marketed to healthcare professionals. It has a 10.4" screen, and it is 10.4"L x 10.6"W x 0.75"D (top)-1.3"D (bottom) and weighs 3.1 lbs.[142] Attached as Exhibit 43 are images of the Panasonic Toughbook H1 MCA tablet. This device is designed to incorporate "[r]efined ergonomics (rearranged controls, added handstrap, dual digitizers, etc.)."[143]

Panasonic Toughbook H1 MCA

[140] *See* http://medgadget.com/2007/03/philipsintel_mo.html.
[141] *Id.*
[142] *See* http://www.ruggedpcreview.com/3_slates_panasonic_h1.html; http://www.coolest-gadgets.com/20081106/panasonic-toughbook-h1-mobile-clinical-assistant/.
[143] *See* http://www.ruggedpcreview.com/3_slates_panasonic_h1.html.

140. The Vinci Tablet is a 7" tablet computer. Attached as Exhibit 44 are images of the Vinci Tablet. This device has a rectangular display area inside an outer border with chamfered corners, which in turn is placed within a rubberized "protective ring." This protective ring offers ergonomic benefits because, as one reviewer noted, it "serves as a bumper against drops or collisions."[144] Another reviewer explained that "one of the Vinci's greatest advantages is that it isn't nearly as easy to break as an iPad."[145]

Vinci Tablet

B. The D'889 Patented Design Is Not Dictated by Function

1. The overall design is not dictated by function based on the principles of ergonomics and human factors.

141. As noted above, the D'889 Patent sets forth a specific design of a tablet computer. As set out in Section V.A., my understanding is that the standard for functionality is stringent—*i.e.*, whether a design is "dictated" by the use or purpose of the article. In my opinion, the overall design set forth in D'889 is not functional based on the principles of ergonomics and human factors.

142. A tablet should be capable of being safely held in one or both hands. This is

[144] David Pierce, "Vinci Tab Review," PCMag, Sep. 22, 2011, http://www.pcmag.com/article2/0,2817,2392593,00.asp (APLNDC-Y0000233684).

[145] David Pierce, "Vinci Tab Review," PCMag, Sep. 22, 2011, http://www.pcmag.com/article2/0,2817,2392593,00.asp (APLNDC-Y0000233684).

largely an issue of object size and is not driven by object shape (assuming that the design meets the minimum safety requirements for its intended use). Beyond that, myriad design choices determine the exact shape and appearance of the device. While ergonomic considerations may influence the design process to some extent, they do not dictate any specific form factor. Instead, the final design is the result of various trade-offs between aesthetic considerations and feature-related priorities.

143. The variety of forms of tablets included in this report is only a sample of the many alternatives on the market. Designs that incorporate features such as a handle are more ergonomic because they are easier to grasp and carry in one hand. The incorporation of a handstrap further adds to safe, one-handed carrying of the tablet. Some forms, such as the Vinci, provide addition graspable areas for two-handed holding. The variety of forms shown above illustrates that the principles of ergonomic design do not dictate any particular form of tablet.

144. Moreover, the variety of iPad accessories on the secondary market suggests that the iPad and iPad 2 do not have ergonomically optimal designs for some consumers. There is a large market for iPad and iPad 2 accessories, including those that allow users alternative methods to enter commands or information (*e.g.*, keyboards or a mouse) and those that allow users to more easily use these devices (*e.g.*, stands or cases). For example, Griffin sells a product called the AirStrap, which is a molded frame with "thick, comfortable, contoured grips" and a "wide neoprene strap on the back."[146] The AirStrap "hugs your hand, making your iPad easier to hold whether you're reading in a coffee shop or checking out the headlines as you ride the 6:45 in to work."[147] This product suggests that the various models of the iPad can be improved for some people for some uses, such that the specific design of a tablet is not dictated by the function of a tablet.

[146] *See* https://store.griffintechnology.com/airstrap.
[147] *Id.*

145. The AIData Spinstand attaches to an iPad tablet and provides additional ergonomic benefits by allowing for an easier grasp to hold the device, and also by serving as a stand for the device. AIData sells Spinstand multi-function stands that work with both the iPad and iPad 2 models.[148]

146. Apple also offers accessories that allow the iPad devices to be used in a more ergonomic manner, such as the iPad Smart Cover, which is "compatible with iPad 2 or later."[149] The iPad Smart Cover allows for automatic on/off control and also folds to create a stand for the device.[150] Apple sells a wireless keyword for the various iPad models,[151] and Apple.com also

[148] *See* http://www.ergocanada.com/detailed_specification_pages/aidata_spinstand_multi_function_stand_for_ipad.html; http://www.ergocanada.com/detailed_specification_pages/aidata_tabstand_multi_function_stand_for_ipad_2.html.

[149] *See* http://store.apple.com/us/product/MD306.

[150] *Id.*

lists a variety of stands for sale.[152] Because the iPad devices do not include a substantial speaker, there are also many external speakers available for the iPad.[153]

147. Instead, designs can be based on aesthetics and various design trade-offs, such as ease-of-use or durability. Griffin also sells the "Survivor" case, which is a "shatter-resistant polycarbonate frame clad in rugged, shock absorbing silicone," with a "built-in screen protector" and "hinged plugs" to seal connectors and ports.[154] Thus, the thin profile and completely glass surface likely do not optimize durability. Griffin also sells a variety of stands and cases that facilitate use of the iPad devices under a variety of circumstances.[155]

148. The availability of these secondary-market accessories suggests that the design of the iPad devices were not dictated by ergonomics or human factors.

2. The individual elements in the D'889 patented design are not dictated by function based on the principles of ergonomics and human factors.

149. Dr. Lehto asserts that the "[r]ectangular shape or form factor" and the "[r]rounded

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[151] *See* http://store.apple.com/us/browse/home/shop_ipad/ipad_accessories/keyboards.
[152] *See* http://store.apple.com/us/browse/home/shop_ipad/ipad_accessories/stands.
[153] http://store.apple.com/us/browse/home/shop_ipad/ipad_accessories/speakers.
[154] *See* http://store.griffintechnology.com/ipad/survivor-ipad-3.
[155] *See, e.g.*, http://store.griffintechnology.com/ipad/ipad-2/elan-folio-leather (Élan Folio, a multi-position fold-over case).

edges, smooth flat front surface, rounded corners, and thin form factor" are functional elements of the D'889 patented design.[156] For the reasons discussed below, in my opinion, none of these elements discussed by Dr. Lehto is dictated by the principles of ergonomics and human factors.

150. Dr. Lehto states that "a rectangular shape or form factor plays an important functional role for electronic devices."[157] He asserts that "[t]wo critical elements drive the form of such devices, namely the display and internal components, which tend to be rectangular in form."[158] The shape of these components do not dictate the overall appearance of the design of a tablet device; the casing of a tablet device could be rectangular with rounded edges of different radiuses, rectangular with squared edges, square-shaped, or clamshell form, among others. In my opinion, ergonomic principles do not dictate any specific form factor, and, indeed, different tablet computer designers have utilized different form factors.

151. The fact that rectangular shapes are "used in most [electronic] devices"[159] does not mean that the choice of a rectangular shape is driven by ergonomic considerations, that other shapes are ergonomically unsound, or that other forms factors cannot be used. As the diversity of form factors on the market demonstrates, there are a variety of form factors that satisfy the minimal ergonomic requirement that the tablet can be held with one or two hands.[160] I note that Dr. Lehto does not present a detailed analysis of any of the many different form factors on the market.[161]

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[156] Lehto Report at 6–8.
[157] Lehto Report at 6.
[158] Lehto Report at 6.
[159] Lehto Report at 6.
[160] Dr. Lehto suggests that many consumer electronics devices are rectangular because there are key pads or keyboards. *See* Lehto Report at 7. As noted above, handheld electronic devices utilize a variety of form factors notwithstanding the fact that many have key pads, keyboards, or both. *See* discussion *supra* ¶ 98 & note 85.
[161] *See* Lehto Report at 30–31.

152. Dr. Lehto also asserts that "[a] rectangular form is also a natural outcome of using rows and columns as an organizing principle by displaying information elements in rectangular windows."[162] As discussed below, information and control elements need not be displayed in rectangular windows.[163] Yet even if such information and control elements are often displayed in rectangular format, it does not "dictate" that the design of a tablet be rectangular in form. The casing on the device could take the form of any number of shapes.

153. Dr. Lehto also asserts that rounded edges, a smooth flat front surface, rounded corners, and a thin form factor are functional features of the D'889 Patent.[164] Because these design features are not mandated by ergonomic factors, I disagree that they are functional on that basis. As discussed above,[165] one generic ergonomic recommendation for touchscreen tablet designs is for the active area of a touchscreen to have a flat, smooth surface free from warping or surface imperfections, but this is not a requirement. However, even if all manufacturers followed this recommendation, it would not result in identical-looking tablet computers because a variety of design alternatives can satisfy other possible ergonomics considerations, such as avoiding sharp corners or edges that could lacerate the skin or cause uncomfortable compression through the use of softer materials, protective covers, and many different corner radiuses that can be two- or three-dimensional. Again, the multitude of tablets on the market demonstrates that ergonomic considerations do not mandate any particular corner design and this applies to these elements as well.[166]

154. There are tablets in the marketplace with rounded corners (both small and large radius corners), squared corners, chamfered corners, and corners with a cut-out space. The

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[162] Lehto Report at 7.
[163] *See* discussion *infra* ¶¶ 162–168.
[164] Lehto Report at 8.
[165] *See* discussion *supra* ¶ 125.
[166] *See* discussion *supra* ¶¶ 126–140.

spectrum of available options is far more varied than the dichotomy of sharp vs. rounded that Dr. Lehto appears to suggest.[167] Indeed, Dr. Lehto oversimplifies the design process by suggesting that designers must round their corners in order to "[e]liminat[e] sharp corners" and thus adhere to a "standard approach followed in safety engineering and ergonomics for eliminating hazards and discomfort by reducing force concentrations at the location where objects contact the body."[168] A tablet will not be held at the corners, so the corner shape is not a major consideration in this respect from an ergonomics perspective. Tablet designers can incorporate ergonomically acceptable corners that are squared or chamfered. Dr. Lehto also states that the use of rounded edges and corners "reduce[] the chance the person will fumble and drop the device or otherwise damage the product."[169] Significantly, the large secondary market for cases to protect the iPad and iPad 2 from damage when dropped suggests that the rounding of the iPad and iPad 2's corners did not allow Apple to create a tablet that was very difficult to drop accidentally.

155. Dr. Lehto's considerable discussion of rounded corners being functional focuses on the potential safety benefits of rounded versus square corners on a product. However, there are many ways to protect the corners of a product. Square corners can be covered with flexible material, such as rubber, or harder material, such as a plastic bumper. A corner can also be rounded along two dimensions or along three dimensions. What is lacking from Dr. Lehto's analysis is the recognition that a primary reason for having rounded corners is for aesthetic design reasons rather than functional ones and that "rounded" can encompass a multiple of alternative designs.

156. As to a "flat smooth surface,"[170] there are no mandatory ergonomic requirements that would dictate such a form for the overall shape of the tablet computer, only a

[167] *See* Lehto Report at 8.
[168] Lehto Report at 8.
[169] Lehto Report at 8.
[170] Lehto Report at 8.

recommendation with respect to the design of the active touchscreen areas on tablets.[171] A tablet could have a raised or sunken screen, which would help differentiate touch-sensitive part of screen from other parts of front face. Even if a smooth surface were deemed necessary to use the touch-sensitive portion of the phone, this consideration would not require that the entire front face of the device be smooth. A designer could frame the surface with plastic, include a variety of buttons, or incorporate a keyboard above, below, or adjacent to the screen as shown by some of the tablets illustrated in this report.[172] Those alternative design features would not interfere with the user's unimpeded view of and access to the touch-sensitive parts of the screen. Indeed, many of the covers available on the secondary market simulate the addition of such features. Moreover, Dr. Lehto's assertion that a smooth flat surface "eliminates clutter" is precisely an ornamental or aesthetic goal, not a functional one.[173] In reality, in terms of function, there can still be the same number of buttons. Each function still requires a button, but because these are electronic softkeys that can be hidden beneath a smooth surface, this design gives the illusion of eliminating clutter which is an ornamental goal. This specific design does not change the function of the tablet.

157. Dr. Lehto also states that "[a] thin form factor further contributes to the overall portability of an electronic device, by both reducing weight and making it easier to stow the device."[174] Though thinness can help make a device more portable, Dr. Lehto does not conclude that the thinness of the D'889 patented design is dictated by ergonomic principles. Thinness is often achieved in the design process only through trade-offs by minimizing the importance of another feature. The thinness of a device may add to the perception that it is also lightweight, but weight is a function of materials as well and not just thickness. The use of rounded sides can also contribute to the perceived thinness of a device. Given the iPad and iPad 2's respective thinness,

[171] *See* discussion *supra* ¶ 125.
[172] *See* discussion *supra* ¶¶ 126–140.
[173] Lehto Report at 8.
[174] Lehto Report at 9.

the weight of these devices is deceptively heavy. Moreover, Dr. Lehto's position seems to be that any degree of thinness is functional. If this were true, then any design could be considered functional because thinness is a matter of degree relative to other widths. I do not believe that ergonomic principles dictate any particular form factor for a tablet computer.

X. THE D'790, D'305, AND D'334 PATENTED DESIGNS ARE NOT DICTATED BY PRINCIPLES OF ERGONOMICS AND HUMAN FACTORS

A. The Principles of Ergonomics and Human Factors Do Not Dictate Any Particular Graphical User Interface Design for a Smartphone.

158. As detailed below, in my opinion, considerations of ergonomics and human factors do not compel a particular design for the graphical user interface of a smartphone. Rather, principles of ergonomics and human factors are guidelines that allow for substantial design variations for graphical user interfaces that provide the same functionality. In my opinion, the variety of different graphical user interfaces on smartphones on the market confirms that ergonomic and human-factors principles impose minimal restrictions on the design choices available to smartphone designers and do not dictate any particular graphical user interface design for smartphones, let alone the specific designs set forth in the D'790, D'305, and D'334 patents.

159. The specific appearance of a smartphone graphical user interface is not dictated by the purpose or use of a smartphone. The main ergonomic requirement for a smartphone graphical user interface is that the interface be visible, usable, and understandable, and that requirement imposes minimal restrictions on the actual appearance of the graphical user interface. In terms of any ergonomic requirements, the specific icons used can take many shapes or sizes, and the images used on the icons themselves can take nearly any pictorial, numerical, or textual form.

1. Dr. Lehto has not identified ergonomic principles that would dictate a particular smartphone or media player design.

160. Dr. Lehto has not pointed to any guidelines or principles that support his position that the D'790, D'305, and D'334 patented designs are dictated by the purpose or use of smartphones or media players.

161. Dr. Lehto refers to the "Apple iOS Human Interface Guidelines" to support the proposition that "contemporary design of electronic devices involves a process of systematically analyzing the needs and wants of the intended customer, and assessing the degree to which the provided features satisfy these requirements."[175] These Guidelines are directed to the developers of software 'apps' that run on the iOS operating system, where Apple has set certain aesthetic standards for icons. In that context, they offer guidelines for designing interface elements that will be used in the Apple iOS environment. These Guidelines do not suggest that Apple is encouraging developers to follow these specific guidelines when designing interface elements for use on other platforms. Therefore, these Guidelines do not dictate the use of specific interface elements in any absolute sense, contrary to what Dr. Lehto suggests. Moreover, even taken at face value, the Guidelines are just that—guidelines rather than rules.

162. In his report, Dr. Lehto also discusses various other human-factors considerations, such as Fitts' Law, "the notion of functional grouping of controls," and the principle of consistency.[176] Fitts' Law applies to many interfaces, such as remote controls. As with smartphone interfaces, there is still considerable room for trade-offs, choices, and aesthetic considerations. While such principles may guide the design process, they do not dictate any specific graphical user interface design for smartphones. Alternative designs can also be

[175] Lehto Report at 5, 16. The Apple iOS Human Interface Guidelines may be found at: http://developer.apple.com/library/ios/documentation/UserExperience/Conceptual/MobileHIG/MobileHIG.pdf

[176] Lehto Report at 23-24.

consistent with these considerations. Therefore, it is my opinion that principles of ergonomics and human factors do not dictate that a grid of rectangular icons with rounded corners is the only way to display and arrange icons on a display screen.

163. There are ergonomic recommendations for elements of screen icon design.[177] Section 6 of the ISO 11581-1 standard for information technology graphical user interfaces states that "[i]t is important that icons are viewed not only as individual graphics with their associated functionality, but also that the context in which they are used is considered as well."[178] In Section 6.3.2, the standard addresses the global variations for corner attributes, and, as illustrated, a rounded corner is only one of the acceptable ergonomic designs.

ISO/IEC 11581-1:2000(E)

6.3.2 Global variations for corner attributes are: rounding, beveling, radius, and connection, as illustrated in Figure 7.

Figure 7 — Examples of corner attributes

[177] ISO/IEC 11581-3 2000, INFORMATION TECHNOLOGY – USER SYSTEM INTERFACES AND SYMBOLS – ICON SYMBOLS AND FUNCTIONS: PART 1 ICONS - GENERAL, Internatonal Standards Organisation, Geneva, Switzerland, 8.

[178] *Id.*

164. Software interfaces such as Google+ offer a circular arrangement of icon images reminiscent of an old-style rotary telephone dial, as shown below.[179]

165. There are several software interfaces for Windows PCs that offer a circular icon arrangement, which are also similar to an old-style rotary telephone dial, as shown below.[180]

166. Therefore, it is my opinion that principles of ergonomics and human factors do not dictate that rectangular icons with rounded corners or that a grid of these icons is the only way to display and arrange icons on a display screen.

2. There are several viable alternative designs available on the market that are consistent with principles of ergonomics and human factors.

167. There are several examples of alternative graphical user interface designs for

[179] http://product-ivity.com/discovering-the-lost-tribes-of-the-google-plus-ecosystem/.
[180] http://www.techyard.net/circle-dock-application-launcher-for-windows/.

mobile devices. For example, Sony Ericsson's Xperia Arc S smartphone displays a grid of icons that are presented as irregular shapes. Attached as Exhibit 45 are images of the graphical user interface of Sony Ericsson's Xperia Arc S. The Blackberry Storm 2, on the other hand, features its icons in a grid format, but each icon is set against an individual black rectangle. The black rectangle nearly completely fills the space between icons. Attached as Exhibit 46 are images of the graphical user interface of the Blackberry Storm 2. The icons are not set against a colorful, rounded rectangle in either of these devices.

168. Other smartphones further illustrate alternative approaches to displaying icons. For example, the Nokia N9 shown below demonstrates that it is not essential that icons be displayed in a 4 x 4 or 4 x 5 grid. Moreover, the icons displayed on the Nokia N9 have a different shape than those depicted in the D'790, D'305, and D'334 Patents, as do the icons displayed on the Blackberry Torch 9850, also shown below. Attached as Exhibits 47 and 48 are images of the Nokia N9 and Blackberry Torch 9850, respectively. Other smartphone designs, such as the HTC

HD2 T8585[181] and the KDDI INFOBAR A01,[182] show icons arranged without using a rectangular grid of rows and columns. The Samsung Omnia 7 runs the Windows Phone 7 OS, which uses an interface consisting of rectangular shapes of various sizes and designs.[183]

Nokia N9

Blackberry Torch 9850

[181] http://www.lovebargaining.com/t8585-hd2-43-inch-screen-windows-mobile-65-os-50-pixel-camera-build-in-gps-wifi-gsensor-cell-phone-p-276.html; http://www.amazon.com/HTC-Unlocked-Screen-Windows-Professional/dp/B0030MHQXO.

[182] http://www.warungdigital.com/wp-content/uploads/2011/05/kddi-infobar-a01-android.jpg.

[183] http://www.samsung.com/global/microsite/omnia7/.

HTC HD2 T8585

KDDI INFOBAR A01

Samsung Omnia 7

B. The D'790 Patented Design Is Not Dictated by Function

169. As evidenced by the many available alternative graphical user interface designs discussed above,[184] principles of ergonomics and human factors do not dictate the specific design depicted in the D'790 Patent, nor do they dictate the use of the individual features identified by Dr. Lehto in his report. As discussed above, my understanding is that Dr. Lehto's piecemeal analysis of the D'790 Patent is improper, yet I will address the individual elements he describes for the sake of completeness.

170. Simply put, principles of ergonomics and human factors do not dictate the design of a graphical user interface that displays icons only in the shape of rounded rectangles, evenly spaced in a grid-like array. Any number of icon shapes or sizes or icon graphics with different corner designs could be ergonomically viable alternatives. Dr. Lehto discusses the importance of the size of the target in interface design and appears to conclude that the particular arrangement depicted in the D'790 Patent "is the inevitable outcome if a designer tries to achieve the functional goal of efficiently and effectively fitting a set of control/display elements into the space available."[185] Yet Dr. Lehto's analysis simply does not support this conclusion. The icon sizes in the various iPhone models, the Windows phones, and the other examples shown above are all different.[186] For example, his report does not take into account that the specific shape of the icons is purely ornamental; the function of an icon does not require that the icon appear in the shape of a rectangle with rounded corners. Moreover, much of Dr. Lehto's analysis seems to focus on the importance of the size of the active area beneath an icon. Recommendations for the size of a softkey touch area are contained in the ANSI/HFES 100 standard, which states in Section 6.2.9.1 that the Minimum Touch areas (*i.e.*, softkeys) should be at least 9.5mm (0.4 in.)

[184] *See* discussion *supra* ¶¶ 164–165, 167–168.
[185] Lehto Report at 23.
[186] *See* discussion *supra* ¶¶ 164–165, 167–168.

wide and 9.5 mm (0.4 in.) high. If the touchscreen and the image plane of the screen are separated, the dimensions of the touch areas should be increased to avoid user performance degradation attribute to parallax problems. The optimum touch-sensitive area depends on the application and required accuracy. Touch areas greater than 22 mm square do not improve performance.[187] The size of the softkeys on the iPhone devices clearly do not conform to this ergonomic recommendation and, consequently, ergonomic considerations did not drive the design of the icons or their spatial arrangement.

171. In addition, though consistency may be an important principle of interface design, it does not dictate this particular graphical user interface. Several of the alternative designs discussed above similarly incorporate consistent graphical elements.[188]

C. The D'305 Patented Design Is Not Dictated by Function

172. For the same reasons discussed above,[189] the design depicted in the D'305 Patent is not dictated by principles of ergonomics and human factors. As explained above, the specific arrangement of rectangular icons with rounded corners is not the only way to design an ergonomically viable graphical user interface.[190]

173. In his discussion of the D'305 Patent, Dr. Lehto also concludes that "the provided pictorials or icons are highly functional and consistent with the efforts of practitioners in Human Factors Engineering and other fields to develop easily understood pictorials and icons that are both easily discriminable and meaningful to the intended audience."[191] Again, Dr. Lehto's

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[187] *See* R.J. Beaton & N. Weiman, *Effects of Touch Key Size and Separation on Menu-Selection Accuracy*, Tech. Report TR 500-01 (Beaverton, OR: Tektronix, Human Factors Research Laboratory, 1984); D.B. Beringer & J.G. Peterson, *Underlying Behavior Parameters of the Operation of Touch-Input Devices: Biases, Models, and Feedback*, 27 Human Factors 445, 445–458.

[188] *See* discussion *supra* ¶¶ 164–165, 167–168.

[189] *See* discussion *supra* ¶¶ 163–171.

[190] *See* discussion *supra* ¶¶ 163–168.

[191] Lehto Report at 26.

conclusion does not rise to the stringent level that I understand is required under design patent law—*i.e.*, that the purpose or use the device "dictate" the particular design at issue. Any number of pictorial images could satisfy these goals of being easily understood and meaningful as is recommended by ISO 11581.[192] Several of the alternative designs discussed above offer examples of other pictorial icons that are viable from a human-factors perspective.[193] The notion that a specific pictorial image must be used to design a graphical user interface consistent with human-factors principles is not supportable.

174. Dr. Lehto also suggests that this design is functional given Apple's practice of making iPhone application icons consistent in their appearance by placing a pictorial image in a rectangle with rounded corners.[194] This analysis improperly concludes that because Apple appears to desire consistency in the graphical design of icons within its own mobile OS, it follows that *all* mobile OS platforms must use consistent graphical icons. Nothing in Apple's iOS Human Interface Guidelines supports that conclusion. Rather, though Apple may desire consistency in the appearance of its graphical user interface design, Apple's desire for consistency simply does not dictate the use of icons of a particular shape or pictorial image.

D. The D'334 Patented Design Is Not Dictated by Function

175. For the same reasons discussed above,[195] the design depicted in the D'334 Patent is not dictated by principles of ergonomics and human factors. As explained above, the specific arrangement of rectangular icons with rounded corners is not the only way to design an ergonomically viable graphical user interface.[196] Indeed, there are several other different user

[192] *See* source cited in notes 177–178.
[193] *See* discussion *supra* ¶¶ 164–165, 167–168.
[194] Lehto Report at 27–29.
[195] *See* discussion *supra* ¶¶ 163–174.
[196] *See* discussion *supra* ¶¶ 163–168.

interfaces with the same or similar functionality, as shown in ISO 11581-1.[197] In addition, the particular pictorial images shown in the D'334 Patent are not dictated by principles of ergonomics and human factors for the same reasons discussed in connection with the D'305 Patent.[198]

176. Dr. Lehto identifies two additional elements in the D'334 patented design not present in the D'305 Patent. First, the D'334 Patent depicts two additional icons between the three top rows and icons and the row of icons against the gray band at the bottom of the interface display. Dr. Lehto suggests that the addition of this "fourth row of square elements assumed to be icons in the D'334 patent increases the number of interface elements that can be shown in the rectangular viewing area" and "is therefore clearly functional."[199] But in his analysis of the D'790 and D'305 Patents, which do not display icons in this "fourth row," Dr. Lehto stated that "[t]he blank row could play a functional role in some interfaces, as a strategy for separating groups of controls that are in some way functionally different."[200] These two design variations cannot both be "dictated" by function in light of principles of ergonomics and human factors. Indeed, Dr. Lehto's conflicting analysis underscores his conflation of the concepts of being "dictated" by function, on the one hand, and having a function, on the other.[201]

177. Second, Dr. Lehto notes the "[i]nclusion of two dots above the bottom row of interface elements," which "depict[s] a centered progress bar indicator."[202] The fact that "[p]rogress bars are commonly used in the design of graphical user interfaces" does not mean that they constitute a single required design element under principles of ergonomics and human factors. Moreover, Dr. Lehto's assertion that they are "well recognized as an important approach

[197] *See* source cited in notes 177–178.
[198] *See* discussion *supra* ¶¶ 172–174.
[199] Lehto Report at 30.
[200] Lehto Report at 23, 25.
[201] *See* discussion *supra* ¶¶ 89, 110, 117.
[202] Lehto Report at 30.

for enhancing the attractiveness . . . of programs that incorporate them"[203] supports the conclusion that these features serve a largely ornamental purpose. To the extent that progress bars "enhance[e] the . . . effectiveness of programs that incorporate them,"[204] they appear to serve the purpose of indicating what page of a display the user is viewing. That purpose does not dictate any one form of progress bar, as the indicators could just as easily be depicted in another shape, such as squares, rectangles, diamonds, lines, or even a scroll bar. The screens could also be numbered. Principles of ergonomics and human factors do not dictate that progress bars take any particular shape or form.

XI. APPLE'S ASSERTED ORIGINAL IPHONE, IPHONE 3G, IPHONE 4, AND IPHONE TRADE DRESS ARE NOT FUNCTIONAL BASED ON PRINCIPLES OF ERGONOMICS AND HUMAN FACTORS

178. As with his analysis of the various design patents at issue, Dr. Lehto improperly engages in a piecemeal analysis of the alleged functionality of Apple's Original iPhone Trade Dress, iPhone 3G Trade Dress, iPhone 4 Trade Dress, and iPhone Trade Dress.[205] It is my understanding that the overall appearance of a trade dress must be considered under a proper analysis of trade dress functionality.[206] In analyzing whether Apple's asserted trade dress is essential to the use or purpose of the various models of the iPhone based on principles of ergonomics and human factors, I examine Apple's trade dress as a whole. I also consider the individual elements discussed by Dr. Lehto for the sake of completeness.

179. In my opinion, the overall appearance of each of the Original iPhone Trade Dress, iPhone 3G Trade Dress, iPhone 4 Trade Dress, and iPhone Trade Dress is not essential to the use

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[203] Lehto Report at 30.

[204] Lehto Report at 30.

[205] In his report, Dr. Lehto addresses "the alleged trade dress of the iPod Touch" and concludes that these "elements provide functionality" and that the dimensions of the device are "functional." Lehto Report at 36. I have been informed that there is no separate iPod touch trade dress at issue in this case, so I will not address that trade dress in my report.

[206] *See* discussion *supra* ¶¶ 24–26.

or purpose of the original iPhone, iPhone 3G, iPhone 3GS, iPhone 4, and iPhone 4S devices. As discussed above, principles of ergonomics and human factors do not dictate a singular industrial or graphical user interface design for smartphones.[207] Apple's asserted trade dress consists of both industrial design and graphical user interface design features.[208]

180. As discussed above, a "rectangular shape with four evenly rounded corners," a "flat clear face," a "large display screen under the clear surface," "[s]ubstantial black borders above and below the display screen and narrower black borders on either side of the screen under the clear surface," a "matrix of colorful square icons with evenly rounded corners," "[a] bottom row (or 'dock') of colorful square icons set off from the other icons, which does not change as other pages of the user interface are viewed" are not essential to the use or purpose of any model of the iPhone based on principles of ergonomics and human factors.[209]

181. Dr. Lehto also states that a "metallic bezel around the flat clear surface, as in the iPhone and iPhone 3G/S, provides functionality for reasons discussed earlier in Section IV" of his report.[210] Dr. Lehto, however, does not discuss the alleged functionality of the "metallic bezel" in Section IV of the report; therefore, he has offered no opinion that I can rebut. Nonetheless, for the sake of completeness, it is my opinion that the metallic bezel in the original iPhone, iPhone 3G, and iPhone 3GS devices is ornamental and is not essential to the use or purpose of the devices from an ergonomic or human-factors standpoint.

182. With respect to the iPhone 4 Trade Dress, Dr. Lehto asserts that the "thin rim adjacent to the face of the phone as in the iPhone 4, provides functionality by providing a surface for placing controls and additional structural integrity."[211] Notably, Dr. Lehto mischaracterizes

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[207] *See* discussion *supra* in Sections XIII & X.
[208] *See* discussion *supra* in Section VI.H.
[209] *See* discussion *supra* Section XIII & X.
[210] Lehto Report at 35.
[211] Lehto Report at 35.

this element of the asserted iPhone 4 Trade Dress; as defined in the Amended Complaint, the iPhone 4 Trade Dress includes "a thin *metallic* band around the outside edge of the iPhone 4, which creates a thin rim adjacent to the face of the phone."[212] Dr. Lehto presents no reasons why a metallic band is essential to the use or function of the device from an ergonomic or human-factors standpoint. Moreover, the numerous alternative smartphone designs that do not include this design element further establish that it is not functional based on ergonomic or human-factors principles.[213]

183. Moreover, contrary to the conclusions in Dr. Lehto's report,[214] my earlier analysis shows that the various models of the iPhone do not have an ergonomically optimal design.[215]

184. For these reasons, the Original iPhone Trade Dress, iPhone 3G Trade Dress, iPhone 4 Trade Dress, and iPhone Trade Dress are not essential to the use and purpose of these devices based on principles of ergonomics and human factors.

XII. APPLE'S ASSERTED IPAD AND IPAD 2 TRADE DRESS ARE NOT FUNCTIONAL BASED ON PRINCIPLES OF ERGONOMICS AND HUMAN FACTORS

185. As with his analysis of the various design patents at issue, Dr. Lehto improperly engages in a piecemeal analysis of the alleged functionality of Apple's iPad Trade Dress and iPad 2 Trade Dress.[216] As stated above, it is my understanding that overall appearance of a trade dress must be considered under a proper analysis of trade dress functionality.[217] In analyzing whether Apple's asserted trade dress is essential to the use or purpose of the iPad and iPad 2 based on principles of ergonomics and human factors, I examine Apple's trade dress as a whole.

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[212] *See* discussion *supra* ¶ 46 (emphasis added).
[213] *See* discussion *supra* ¶¶ 77–87.
[214] *See* Lehto Report at 33–35.
[215] *See* discussion *supra* ¶¶ 68–76.
[216] As set forth above, I have been informed that there are no differences between the asserted iPad Trade Dress and iPad 2 Trade Dress. *See* discussion *supra* ¶¶ 52–53.
[217] *See* discussion *supra* ¶¶ 24–26, 178.

I also consider the individual elements discussed by Dr. Lehto for the sake of completeness.

186. In my opinion, the overall appearance of the iPad Trade Dress and iPad 2 Trade Dress is not essential to the use or purpose of the iPad and iPad 2 devices. As discussed above, principles of ergonomics and human factors do not dictate a singular industrial design for tablets.[218] In addition, for the same reasons discussed in the context of smartphone graphical user interface designs, principles of ergonomics and human factors do not dictate a singular graphical user interface design for tablets.[219] Apple's asserted trade dress consists of both industrial design and graphical user interface design features.[220]

187. As discussed above, a "rectangular shape with four evenly rounded corners," a "flat clear face," a "large display screen under the clear surface," "[s]ubstantial black or white borders on all sides of the display screen under the clear surface," a "matrix of colorful square icons with evenly rounded corners," and a "thin side profile" are not essential to the use or purpose of the iPad and iPad 2 based on principles of ergonomics and human factors.[221]

188. Dr. Lehto also summarily concludes that a "metallic rim around the flat clear surface, as in the iPad and iPad 2, provides functionality by providing structural integrity."[222] Dr. Lehto does not elaborate on this point; he does not point to any specific evidence in support of this conclusion; and he does not appear to base this statement on any ergonomics or human-factors recommendations or requirements. In my opinion, this metallic rim, as visible externally on the device, is ornamental and is not essential to the use or purpose of the devices from an ergonomic or human-factors standpoint.

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[218] *See* discussion *supra* Sections IX.
[219] *See* discussion *supra* Section X.
[220] *See* discussion *supra* Section VI.H.
[221] *See* discussion *supra* Sections IX.
[222] Lehto Report at 37.

189. Moreover, contrary to the conclusions in Dr. Lehto's report,[223] my earlier analysis shows that the iPad 2 does not have an ergonomically optimal design.[224] The same analysis applies equally to the design of the first-generation iPad.

190. For these reasons, the iPad Trade Dress and iPad 2 Trade Dress are not essential to the use and purpose of these devices based on principles of ergonomics and human factors.

XIII. APPLE'S ASSERTED TRADEMARKS ARE NOT FUNCTIONAL BASED ON PRINCIPLES OF ERGONOMICS AND HUMAN FACTORS

191. Dr. Lehto states that "[e]ach of the asserted colorful square icons with evenly rounded corners are [sic] functional,"[225] but his analysis of ergonomic and human-factors considerations do not support this conclusion. Any number of pictorial images could have been used on these icons, and the icons need not be in the shape of a rounded rectangle. Users could just as easily access applications on the iPhone and iPad if icons with different shapes and different pictorial images were used. In my opinion, none of these asserted trademarks is essential to the use or purpose of any of the various generations of the iPhone and iPad based on principles of ergonomics and human factors.

XIV. CONCLUSION

192. In my opinion, the designs set forth in the Asserted Design Patents as well as Apple's asserted trade dress and trademarks are not functional in terms of ergonomics or human factors. There are numerous commercial alternatives to these designs on the market that perform equivalent functions and their forms have not been driven primarily by ergonomic design requirements. Thus, under the law as it has been explained to me, ergonomics and human-factors considerations do not dictate a single design that is required to perform the functions of a smartphone or tablet, nor is any one such design essential to the use or purpose of a smartphone

[223] *See* Lehto Report at 36–37.
[224] *See* discussion *supra* Section IX.
[225] Lehto Report at 38.

or tablet. For the same reasons, the individual elements discussed in the report of Dr. Lehto are also not functional.

XV. SUPPLEMENTATION

193. I reserve the right to supplement this report with new information and/or documents that may be discovered or produced in this case.

XVI. EXHIBITS TO BE USED

194. I anticipate using as exhibits during trial certain documents and things referenced or cited in this report or accompanying this report. I also anticipate using other demonstrative exhibits or things at trial.

Dated: April 16, 2012

ALAN HEDGE