DragonID, LLC's Narrative – Records for Life

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Team Biosketch

DragonID's team consists of aerospace, biomedical, chemical, computer, and mechanical engineers, as well as a language, communication, and pedagogy specialist.

Key Design Points

- Extra-large size allows for easy readability, plenty of space for pertinent information, and a lot of open space for adding supplementary information. The formatting provides easy storage as a rolled document.

- Superampiphobic paper, which significantly exceeds the durability requirements of submersion in a water-sand mix, or drips of oil, alcohol, or water.

- Roll-up storage and cylindrical container to ensure longevity and durability. The clear container is brightly marked and has a handle for easy transport with full hands.

- Two-sided and oversized in order to accommodate both healthcare workers and caregivers by providing sufficient space for the former to utilize, and sufficient space for a complete infographic guide for the latter.

- Language-barrier proof: because the document conveys the vast majority of the information through infographics and easily understood icons, mass-production schedules need only consider a target region's primary dialect.

- Digital-ready: the unique ID is part of the document itself, rather than a post-production addition, in order to provide multi-point redundancies for paper and digital backup.

- Survey-ready: the document contains an easily updated and synchronized array of information for quick assimilation by survey personnel.

- A bright double border in ANSI Yellow-Green and ANSI Fluorescent Red Retroreflective coloring that has been proven to attract attention to itself, and allow for easy differentiation of this critical document.

DragonID LLC

Life of a Health Record

Stage 1: Production

The health record is mass-produced and printed on Georgia Tech's recently discovered superampiphobic paper[1], which completely repels both oil and water. The university has already responded eagerly to our queries for making the paper available at low cost for humanitarian purposes. The complete production also includes a plastic cylindrical container for storage in order to ensure longevity.

Stage 2: Worker Introduction

Healthcare workers, regardless of experience level, quickly and easily understand the conveyed information. Because the document transcends language barriers, a brief introduction to the material for both temporary and long-term healthcare workers will continue shortening an already streamlined process. The record contains critical information such as the immunization schedule, growth chart, weight char, plenty of space for notes or circumstantial information, and space for easy transition between clinics.

Stage 3: Deployment and Maternal Introduction

The mother receives the document at birth. One side of the record graphically accommodates disparities in education or differing cultural norms. In addition to traditional dating, the maternal infographic also uses, and emphasizes, an interactive weekly check-off calendar to display pediatric milestones, such as breast feeding, switching to solid foods, and walking. The check-off allows for extensive interaction with the health record, allowing for the mother to familiarize herself with its contents, as well as to more easily memorize information on it. The imagery is clear and concise to avoid confusion on the part of the mother and healthcare workers, and only a brief introduction to the family is required. The immunization schedule is on the infographic in order to facilitate both timely planned immunizations and potential spontaneous immunizations. The document provides the family with developmental milestones for their new child that encourage ideal maternal behavior, and provide a warning sign if additional medical attention may be necessary.

Stage 4: Computerization

The document is ready to be stored digitally at point of production because the unique child identification is a part of the document itself. Since the immunization schedule is marked graphically, there is no need for handwriting analysis during the digital transition. Because the unique identification will remain unique throughout the lifecycle of the document, a digital infrastructure for international deployment can be developed and accessed at the point of paper deployment without concern for cross-identification related confusion.

[1] Design and Fabrication of Superamphiphobic Paper Surfaces
Lester Li, Victor Breedveld, and Dennis W. Hess
ACS Applied Materials & Interfaces 2013 5 (11), 5381-5386

Milestones

Durability: Superampiphobic paper. Refer to Stage 1 for details.

Transportability: The document as a lone unit is large and marked with ANSI Yellow-Green and ANSI Fluorescent Red Retroreflective[2] border in order to prevent accidental misplacement. The cylindrical storage container is designed with portability in mind. Similar markings prevent misplacement, and identifying icons like a red cross/crescent and baby prevent misidentification. The document is both too big to lose and small enough to be easily and safely transported. The bottle also has a handle, and a lanyard to allow for easy transportation with full hands.

Storage: The addition of a container and the immunity to common household wear and tear will encourage easy access and storage within the household. Unlike current modalities, the document package is durable enough that extra care by the family is not required.

WHO Vaccine Compliance: The caretaker's side of the document shows clearly when vaccines are due on the caregiving timeline, which vaccines are due, which route they are, allows for easy markings to show that a vaccine has been administered, allows ample space and a template for out-of-schedule or additional templates, allows for notes on vaccinations, and shows the number and abbreviation of the vaccine. All of this is done in pictogram form that is incredibly easy to understand. The health worker side of the document shows the WHO vaccine schedule. Due to the ample space provided, there can be a more complete listing of vaccines than just the minimum WHO schedule, with possible regional customization.

Misinterpretation: Because the schedule lines up with visually discernible milestones, and because the otherwise arbitrary data exists visually instead of as a series of vaguely marked boxes, the document greatly reduces the possibility of human error for the healthcare worker.

Redundancy: The increased resilience of the document provides redundancy even in the most remote locations. As long as both the clinic and caregiver have a copy, and the health worker makes a minimal effort to maintain synchronization between both copies during scheduled visits, discrepancies and information loss become extremely unlikely. At full deployment as both a paper and digital system, replacement of a uniquely identified document becomes trivial.

[2] International Safety Equipment Association.
ANSI/ISEA 107-2010. (2010, January). American National Standard for High-Visibility Safety Apparel and Headwear.
Retrieved October 12, 2013,
from http://www.safetyequipment.org/c/std107-2010.cfm

Additional Criteria

Ease of Adding New Information

Spontaneous Vaccination and Document Versatility: The document provides sufficient space for recording out-of-schedule immunization efforts, without confusing any such immunizations with those that were regularly scheduled. Since the vaccination schedule is clearly displayed through infographic icons, there is no opportunity for human error in the marking or verification process. Because spontaneous immunization efforts are regionally coordinated, problems with handwriting analysis concerning vaccine documentation become irrelevant when the document platform infrastructure is in place, and otherwise minimized even at early deployment. The spontaneous addition of out-of-schedule immunizations or additional data does not affect the overall organization or ease-of-readability of the record since the record itself is designed to accommodate these changes. We account and allow for modifications based on a different vaccination schedule, or the addition/subtraction of whole elements while still maintain the integrity of the timeline, the organization of the document, and the ease of information entry and assessment.

Digital Transition

Visualization of Data: The record itself contains both human and computer readable elements, such as the unique ID of the child that is in a repeatable pattern, that has a checksum integrated into it, as well as such information as localization and place of birth. Furthermore, the immunization history is also computer readable and allows the record to be included in country surveys. The record is designed so that out-of-schedule immunizations are also computer readable since they will follow the standard format of the record. The healthcare worker side of the record provides space for specific actionable information such as the growth chart, space for notes, and circumstantial information. Linking the timeline and notes section together is intuitive and easy due to the design correlation between the two.

Retroactive Data Entry: Since the computer can easily scan and record the most critical pieces of information (ID, immunization, notes, action items, personal information) and the record itself is heuristically designed in such a manner that it forces data recording and retention in an intuitive way, speed of translation from paper to digital is simplified and dramatically accelerated than in current health record modalities. Bulk production and deployment of both the paper and the holding cylinder is possible due to the availability of materials as well as the of the superampiphobic coating. Since the healthcare worker is recording information in a very specific fashion, post-translational accuracy of handwriting reading is based purely on the clarity of the writing and the skill of the translator and not at all on the record itself.