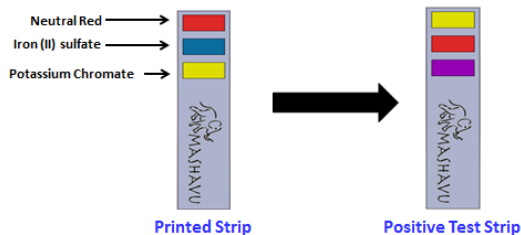


BRAINSTORMING INSTRUCTIONS FOR UTI TEST STRIP DESIGN TASK



<http://ukwelitestrips.weebly.com/our-technology.html>

have been trained to assess the test and provide a diagnosis. Early detection and subsequent treatment of the UTI is expected to reduce morbidity and cost.

Currently, the major design hurdle to overcome is the mechanism by which the test strip is exposed to the urine sample (e.g., immersion, placement of the strip within the urine stream, etc.). Therefore, a reliable solution with significant potential for widespread adoption is sought. Also, a new test strip is currently under development to test for sugar in the urine – one of the signs of diabetes. With current global incidence numbers at over 380 million individuals and annual worldwide expenditure of nearly \$550 billion (and both predicted to grow), diabetes is a health problem of epidemic proportions around the world.² Therefore, a successful solution for the UTI test strip that is adaptable for glucose could have even broader impact and benefit.

Another central tenet is for the Test Strip project is the concept of **Cradle to Cradle** design - a biomimetic approach to the design of products and systems. It is a holistic economic, industrial and social framework that seeks to create systems that are efficient and essentially waste free. The model is not limited to industrial design and manufacturing; it can be applied to many aspects of human civilization such as urban environments, buildings, economics and social systems.

The end goal of this project is a simple, inexpensive, low-waste, and durable system that allows for introduction of a urine sample onto the test strip. The implementation of this new component with the currently manufactured test strip should be accomplished in country with locally-available materials (or those easily and inexpensively imported).

¹ S. August and M. De Rosa, "Evaluation of the Prevalence of Urinary Tract Infection in Rural Panamanian Women," PLOS ONE 7(10), 2012.

² International Diabetes Federation. IDF Diabetes Atlas, 6th edn. Brussels, Belgium: International Diabetes Federation, 2013.

Penn State's HESE (Humanitarian Engineering and Social Entrepreneurship) program has developed affordable test strips for the detection of urinary tract infections (UTIs). Worldwide, UTIs are one of the most commonly contracted bacterial infections among pregnant women. If detected and treated early, these infections are not typically life-threatening but are associated with painful and more frequent urination. Left untreated, however, these infections have the potential to become much more serious, even life-threatening.¹ The strips developed by the HESE team test for three UTI markers measured within a urine sample: (1) increased pH level; (2) presence of E. Coli catalase; and (3) presence of nitrites. The test strips are printed using a standard inkjet printer, providing the opportunity to print the test strips in country, reducing the associated cost and increasing availability. The typical test strip is small; with dimensions of 9 x 100 mm, 100 strips fit on a standard A4 sheet of paper. Distribution of the strips to the targeted customers – pregnant women – will be accomplished through community health workers that