During open-ended play, children inhabit material and immaterial spaces with their bodies and minds. These spaces constitute children’s wonder worlds, microcosms of play and exploration as well as retreats from the “out-of-scale” world of grown-ups. The following paper summarizes the theoretical underpinnings of a broader research project, titled My Workshop, which focuses on the spatial organization and the architectural support of such microcosms that nurture children’s development. Our proposal draws on two conceptual themes that should be considered when designing spaces for children. The first theme explores how bricolage and creative tinkering are integral to play worlds. The idea invokes the creative act of collecting and storing diverse objects and materials. It can be understood as a reflection of the technique for creating a Wunderkammer and engaging in imaginative explorations. The second theme addresses how “tactile intelligence” quite literally accompanies bricolage and should be encouraged in the activities of children. These two themes—tactility and bricolage—permeate our research and support the suggested recommendations on how carefully designed spatial configurations and carefully selected materials can broaden children’s experiences in their personalized realms of experimentation.

When children play they occupy the central focal point, Husserl’s Nullpunkt, of their surrounding environment. They reign over this microcosm and fill it with diverse objects from explorations in and encounters with the adult macrocosm. Children’s fascination with physical objects lies in their ability to trigger imaginary play-experiments and in their role as fragments from the world at large. These traces of experience and learning become valuable for children’s developmental trajectory because the collection of objects stimulates both physically and mentally creative activities that unfold simultaneously on virtual, imaginary planes and in tangible, three-dimensional settings. Having a space for conceptualizing and manifesting ideas is crucial for children’s development as it is for all creative endeavors:

Even the most abstract mind is affected by the surroundings of the body. No one is immune to the impressions that impinge on the senses from the outside. Creative individuals may seem to disregard their environment and work happily in even the most dismal surroundings... But in reality, the spatiotemporal context in which creative persons live has consequences that often go unnoticed. The concept of “workshop” encapsulates the essence of a stimulating environment and serves as a metaphor for the physical space in which children can store the physical components of their microcosms as well as engage in the activities these objects inspire. Workshops in general are personal, customizable spaces that adapt readily to various project needs. They can support both individual- and group-work and they are a safe space for exploring tangents. As a result, our project employs the concept of My Workshop and emphasizes its importance as a physical space that enables bricolage and unstructured playtime.

My Workshop enacts the personal space and the materials a child engages during play which together can be likened to the early modern Wunderkammer (“Chamber of Wonders”). Wunderkammern were considered microcosms of the universe as they contained natural and artificial wonders that stimulated their owners “to become performers.
handling the props to better understand the world.4 From this perspective, each child is a potential bricoleur. As a collector, s/he assembles objects and raw materials for her/his own Wunderkammer-like space and classifies them in a spatially organized collection creating “a visionary prototype of future interconnective systems.”5 All the diverse artifacts of a bricoleur’s collection are assembled and arranged with great care as part of “recognizable genres (…) linked by hidden assumptions and aims.”6 As in the case of the Wunderkammer, despite the variety of collectibles selected by the child, My Workshop flattens possible hierarchies allowing for individual rituals of cross-referencing and for meaningful narratives that are entirely personal and independent though perhaps related to extraneous orders.7 My Workshop acts as a “performative device full of secrets and surprises”8 comprised of an inventory of objects that not only reveals the owners’ psyche but also allows the collector to develop make-believe scenarios through unlimited play sequences. The process of selectively collecting, storing and retrieving components for building imaginary worlds captures the essence of the exploratory mode My Workshop seeks to encourage in children. This type of activity evokes the characteristics of bricolage, which are most apparent when the collector recognizes the inherent potential of an object for future imaginative explorations. Ready-made objects, malleable materials as well as computational materials are part of her/his repertoire and they are not necessarily collected to be reused in the same way they were initially intended. The bricoleur can diligently arrange and rearrange them within the tactile power of the collector plays an important role in constituting our design proposal, each one having different subcomponents that can be used either independently or together. The child is presented with a system of boxes waiting to unfold their hidden spaces. Inspired by the very first definition of architectural space as a shelter for life, we create a variety of spaces by combining different packaging design techniques and materials. The containers can be deployed and utilized in many different ways depending on the problem at hand and the child’s personal preferences. In other words, the design deliberately presents a generic typology. The system of boxes is not defined in terms of its exterior material in order to encourage customization on the part of the child through ad-on layers of materials, colors, and other forms of notation. More specifically, the suggested system of containers fulfills the following guidelines:

- It is portable, lightweight and compact.
- It is made out of cardboard which is a cheap and readily available model-making material.
- It utilizes space in a creative way without imposing a singular use.
- The microcosm of the workshop space comes into being as the system of containers explodes into its sub-components.
- The containers differ in size and material, facilitating that way customization of use.
- The assembly of the system encourages the user to develop her/his own organizational scheme.
- Each part of the system can be replaced individually.
- The system’s design logic is evident and each part is easily reproducible.
- It is an evolving system designed to have an expandable scale that can follow the child’s body scale as it grows up.
- Users can add new construction materials to their kits.
- Children can connect their workshops or parts of their workshops to immerse themselves in their explorations together.
Prior to designing the containers, we analyzed existing construction kits. Most of them tout the child’s potential to become an inventor and make almost anything. LEGO, for example, introduces its Inventor Kit by saying: “If you had the most amazing workshop of gadgets and gizmos you could imagine (…) then what would you make?” However, the descriptions of the games included neglect the physical space of invention while none of the kits fully exploit the potential for the packaging to be a creative construction itself. A very characteristic example is the Playdoh Creativity Table, which is marketed as a place for creative activities: “The Playdoh Creativity Table is the ultimate all-in-one Playdoh play station. The huge workspace provides a place for lots of creative play with markers, crayons, and of course, Playdoh. Kids will enjoy endless fun in this contained play place, featuring (…) Playdoh favorites (…). This toy really gives Playdoh a home with lots of storage for tools and Playdoh cans in the table legs.”

The vivid description of a “contained play place” approaches our idea of My Workshop; but it differs in essentials because it is product specific and thus cannot be customized or support other materials. Another example of a construction kit was developed at the MIT Media Lab and combines computational construction toys, called Crickets with non-computational everyday materials. Crickets have been used in group activities facilitated by the MIT Media Lab and the MIT Museum in after-school-programs and weekend workshops and have yet to be available in kits like their predecessors, the programmable LEGO Mindstorms bricks.

By proposing the idea of My Workshop, we wish to advance an ongoing conversation about shaping children’s spaces for creative exploration. The proposed customizable spatial organization will allow children to adapt to their own style of bricolage. In the same system, materials perform an essential part as supportive and driving forces in all forms of play. The arrangement of the materials ultimately selected should lead to a multifarious mix of computational and non-computational elements that encourages children toward open-ended activities. My Workshop presents a pilot proposal that introduces spatial organization and tactility into discussions around children’s imaginative playtime; but this suggestion merely represents the tip of the iceberg when we consider the contributions architectural design thinking can make towards strengthening the relationship between the micro-worlds in children’s minds and the physical environment in which they play.

acknowledgements
We would like to thank all the people who assisted us with this project, especially Professor Mitchel Resnick, Director of the Lifelong Kindergarten Group at the MIT Media Lab, Stephanie Hunt, Research Associate in Emerging Technologies at the MIT Museum, and Edith Ackerman, Research Scientist at the MIT Media Lab.
The project was initially developed for the MIT Media Lab course titled "Technologies for Creative Learning" under Professor Mitch Resnick during the fall semester of 2004. An extended version of this paper can be found at: http://arasmarttoys.shtml [online], accessed 07 June 2005.

According to Edmund Husserl the body is always the Halbkörper, the zero point of space and the center of retrieval of sense and analysis of consciousness. “Thanks to the body, I can detect things, make a correlation with a body unlike any other, a body that is the body of others.” (Husserl, 1950).

Researchers from the University of Maryland identified the following five elements of play as the most potent ones to carry learning opportunities for children: pleasure, imagination, spontaneity, encouraging active engagement and some make-believe. Kathy Hirsh-Pasek and Roberta Golinkoff, "Innovative Workshops See Mindstorms in the Classroom: The Big Book of Black Box] projects. Many BBB projects make use of LEGO materials (including one component of the construction kits that we provide for the BBB [Beyond the Basic Brick] activity) and LEGO parts, which are used to construct contraptions using a variety of building materials, including motors, sensors, and programmable blocks called "clics." (Crisp, 2003).

The Reggio Emilia Schools in Italy are internationally acclaimed infant-toddler centers and preschools dedicated to building successful learning environments for children. Their research is specifically aimed at developing better physical spaces and teaching "White space" to children. Convergence (2000), p. 17-18.

The following description shows how challenging it can be to provide the right mix of materials for successful "Black Box" projects. Many BBB projects make use of LEGO materials (including not only the traditional building bricks but also gears, axles, and motors) for building structures and mechanisms. We provide a variety of different sensors that enable users to monitor everything from temperature and light to heart rate and galactic scale responses. (…) Amongst other BBB articles, we make sure to supply a wide range of arts-and-crafts materials, including everyday objects such as pipe cleaners, popsicle sticks, and cotton balls. This blend of high-tech devices and arts-and-crafts materials makes possible precise explorations and investigations while simultaneously fostering a spirit of curiosity, resilience, humor, stubbornness, and personal experience.” Mitchel Resnick, Robbie Berg and Michael Eisenberg, "Beyond Black Boxes: Bringing Transparency and Aesthetics Back to Scientific Investigations,” Journal of Learning Sciences 2008.)