ita
YOUR TICKET.

MAKER DAY 2013

MAKER DAY 2013

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IN COLLABORATION WITH

THE UBC OKANAGAN INNOVATIVE LEARNING CENTRE

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INTRODUCTION TO THE MAKER DAY RESOURCES

Celebrating The Best Gifts of Humanity: The Ability to Think Wisely and Tinker Creatively and Share Generously

These resources are provided to help you host your own Maker Day. The materials were developed by the Innovative Learning Centre (ILC) at the Faculty of Education, University of British Columbia Okanagan Campus. They were tested at Maker Day 2013, with generous and helpful support for Industry Training Authority (ITA) and the Women In Trades Program at Okanagan College.

Please use the resources and make them your own. Each document has a Suggested Use paragraph. This will help you understand how you might use each document to host your own Maker Day event.

We welcome all feedback and suggestions for improvement! Please let us know how your Maker event goes and whether other resources are needed.

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A Maker Day is an event that requires participants to thoughtfully and fully engage in design thinking and creative problem finding. At the heart of the day is the Maker ethos which "values learning through direct experience and the intellectual and social benefits that accrue from creating something shareable" (Martinez & Stager, 2013).

The goal of the day is to experience making and tinkering through hands-on activities and design thinking. As part of the day's agenda, participants will be introduced to Design Thinking, Inquiry, Making and Experiential Learning through small group engagement with a pre-designed kit of tools and materials, supplemented by a pantry of extra materials. Participants can draw from the pantry to collaboratively and creatively imagine, design, prototype, tinker, and share the groups' solution to a design challenge.

Each participant will be assigned to a group, and mentors and facilitators will be available to guide the groups and help them make connections to the trades and professions reflected in the work. After completing the Design Thinking activity, groups will be introduced to the problem to solve and shown the content of the kit they will use to create a prototype solution. The problem is clearly described, yet designed to be open enough to support imagination and creative problem finding and solving.

Suggested Use
You might want to use the document Hosting a Maker Day as part of your Maker Day invitation.

MAKING A CASE FOR MAKING

Suggested Use
This document provides background information to the Maker Movement and its tie to Education. You might want to review this document and share it with your facilitators and colleagues.

We have a need to make. It stems from our curiosity with the world and our basic human desire to make things and then make those things better. The Do-It-Yourself movement is evidence of this – from cooking channels to home improvement shows, we have been knitting, tinkering with cars, renovating our homes, and making gifts for friends for ages.

Now, we are reclaiming this need and formalizing it into a movement. We are creating shareable workshops (maker spaces), providing hours of instructional videos (You Tube, Instructables, etc.), and offering workshops (e.g. Home Depot – How to Sessions), reclaiming the model building kits from our recent past and adding 3D printers and robotics. And, educators have a role to play.

Background
North America is in an interesting place. We currently have three generations in our work force. Fifty per cent of the content we access is cloud based. Approximately 95% of 12 – 17 year olds are regularly online, 76% of them use social networks, and 77% have cell phones. Globally, there are over 1 billion smart phones, and the sum of human knowledge, in the form of Wikipedia, is available offline in a downloadable format. We appear to have few problems accessing information or finding opportunities connect.

Basically, we are in a time where digital fluency is an essential skill and we have the potential learn, formally and informally, at any time, place or in format we need. Learning opportunities have probably never been more ubiquitous and flexible.

All levels of education are calling for knowledge skills situated in learning environments that are:

- Learner-centred: highly focused on learning but not as an alternative to the key role for teachers
- Structured and well-designed: needs careful design and high professionalism alongside inquiry & autonomous learning
- Profoundly personalized: acutely sensitive to individual and group differences and offering tailored feedback
- Inclusive: such sensitivity to individual and group differences means they are fundamentally inclusive
- Social: learning is effective in group settings, when learners collaborate, and when there is a connection to community (OECD, 2011).

These learning environments are consistent with what Pink (2005) calls our current Conceptual Age – a time where logical and linear thinking is valued, especially when it is coupled with creativity and innovation. Exploration, visual aesthetics, problem find and problem solving have been identified as essential skills in this age.

Hatch (2014), author of the Maker Manifesto, suggests that as part of this Conceptual Age, we are actually entering a new industrial revolution. If the first revolution was fuelled by factories powered by steam and the second by electricity, our new age is to powered by unlimited access to information, the development of increasingly reasonably price, powerful tools, and the ability to obtain a range globally sourced materials and resources with which to make things. Hatch suggests the Maker Movement is actually an Internet of Physical Things (p. 3) claiming it is actually bigger because it consists of physical objects connected via sensors to the Internet.

Running parallel with this new age and Internet of Things is “the largest untapped human resource on the planet … the space time, creativity, and disposal income of the ‘creative class” (Hatch, p. 52). This group was identified by Richard Florida in The Rise of the Creative Class. Florida suggests this class is an “amalgamation of engineers, artists, lawyers, programmers, designers, and other who have the educational or professional propensity to ‘create’” (Hatch, p. 52). He suggests this class is fostering the majority of contemporary innovation and is moving into advanced manufacturing which in turn is supporting an economic recovery, new employment options, and the rapid growth of the Maker Movement. In 2010, the United States alone, it was estimated there at 40 million Americans in the creative class – 50% of the employed workforce, controlling $474 billion in disposable income (p. 52). This income is increasingly being directed to creative and imaginative work, often using Maker Spaces for prototyping and networking.

Oddly, at the same time, we are questioning where all the skilled workers are in Canada? (Mason, Oct. 18, 2013). Mason states

> Once upon a time, shop class was mandatory in most high schools. There was a belief that even if a student wasn’t intent on becoming a mechanic or carpenter, having some basic life skills in these areas wasn’t a bad thing.
>
> Over time, however, shop began to look dated and irrelevant and was given less status. Somewhere along the way, it was drilled into students that the only way to get ahead in life was to go to university and earn a degree.

It’s time to reinvent shop, making it into something relevant and enjoyment.

Taking Making Into Class

The Maker Movement and classrooms seem perfect partners. Inquiry based learning, problem base learning, constructivism, experiential learning, Reggio Inspired learning all cry out for hands-on approaches to making learning visible.

Sylvia Martinez and Gary Stager, in their highly lauded book Invent to Learn, explain making is an authentic way to bring STEMx (Science, Technology, Engineering, Mathematics and Design) into the classroom. Reading Invent to Learn: Making, Tinkering, and Engineering in the Classroom (2013) is a first step. Chapters include a background to the Maker Movement and the educational leaders who have embraced its principles; a link to current educational theories and practices (constructivism and constructionism), descriptions of good projects to Maker and how to design them, suggestions for classroom design, and suggestions for resources and references.

Making is a pedagogical orientation that integrates imagination and creativity with design thinking, problem solving, and even more importantly, problem finding. We have watched schools turn their libraries into Learning Commons, embracing more than print materials. We are now at the stage of actively turning our art, shop, and learning commons into Maker Spaces. Spaces that have simple hand tools, cardboard, robotics, and 3D printers.

Also, refer to the links in this resource (Designing a Problem Sketch and Annotated Reference List) for ideas and support. Mark Hatch’s The Maker Movement Manifesto is an excellent introduction to the Maker Movement and community based Maker Spaces.

Bringing making into the schools is NOT about adding another course or discipline to an already overcrowded curriculum. Rather, it is an intentional way of integrating STEMx and supporting personalized constructionist learning across the curriculum. It is also a way to encourage ALL students to explore Trades and Technology as a course of study, reclaiming “Shop” as a valuable place to turn theory into practice, ideas into design, design in prototype. Making in the schools

could just begin to answer the question of where the skilled workers are … they are probably right there in our classes just wanting an opportunity to explore their creating and make something new and meaningful!

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DESIGN THINKING

Suggested Use
This document adds background to design thinking. It might be helpful for those new to the approach.

"Design thinking is generally considered the ability to combine empathy for the context of a problem, creativity in the generation of insights and solutions, and rationality to analyze and fit solutions to the context" (Wikipedia, n.d.).

Design thinking aligns nicely with the Maker Movement by helping makers consider what they would like to create and what might be needed. It allows makers to "creatively attack the world's greatest problems and meet people's most urgent needs" (Hatch, 2014, p. 10). As Walt Disney is attributed to have said, "It is kind of fun to do the impossible!"

The process of design is a series of decisions that inform the user experience. "Design doesn't just make things beautiful, it makes them work" (Dadich, 2013). In the 1980's, Dieter Rams, an architect and a designer for Braun, became concerned with the seemingly "impenetrable confusion of forms, colors and noises" in the world around him. To help sort out what might be considered as good design, he drafted ten principles for good design (Vitsoe, 2013). They include:

- Good design is innovative
- Good design makes a product useful
- Good design is aesthetic
- Good design makes a product understandable
- Good design is unobtrusive
- Good design is honest
- Good design is long-lasting
- Good design is thorough down to the last detail
- Good design is environmentally friendly
- Good design is as little design as possible.

Design thinking is a process for solving problems and typically consists of seven steps: define, research, ideate, prototype, choose, implement, and learn.

Define
- Decide what issue you are trying to resolve.
- Agree on who the audience is.
- Prioritize this project in terms of urgency.
- Determine what will make this project successful.
- Establish a glossary of terms.

Research
- Review the history of the issue; remember any existing obstacles.
- Collect examples of other attempts to solve the same issue.
- Note the project supporters, investors, and critics.
- Talk to your end-users, that brings you the most fruitful ideas for later design.
- Take into account thought leaders' opinions.

Ideation
- Identify the needs and motivations of your end-users.
- Generate as many ideas as possible to serve these identified needs.
- Log your brainstorming session.
- Do not judge or debate ideas.
- During brainstorming, have one conversation at a time.

Prototype
- Combine, expand, and refine ideas.
- Create multiple drafts.
- Seek feedback from a diverse group of people, include your end users.
- Present a selection of ideas to the client.
- Reserve judgment and maintain neutrality.
- Create and present actual working prototype(s)

Choose
- Review the objective.
- Set aside emotion and ownership of ideas.
- Avoid consensus thinking.
- Remember: the most practical solution isn't always the best.
- Select the powerful ideas.

Implement
- Make task descriptions.
- Plan tasks.
- Determine resources.
- Assign tasks.
- Execute.
- Deliver to client.

Learn
- Gather feedback from the consumer.
- Determine if the solution met its goals.
- Discuss what could be improved.
- Measure success; collect data.
- Document.

Although design is always subject to personal taste, design thinkers share a common set of values that drive innovation: these values are mainly creativity, ambidextrous thinking, teamwork, end-user focus, curiosity (Wikipedia, n.d.).

Stanford's d.School offers a great series of resources on design thinking. Please explore http://dschool.stanford.edu/dgift/

Tie to Education
Increasingly educators are called upon to be designers of learning experiences. This is a shift from their previous roles as implementers or interpreters of curriculum. A good way to incorporate design thinking in the classroom is to use it to help students intentionally find linkages between authentic learning experiences and curricular problems.

Because of its emphasis on empathy, design thinking invites students to focus on human centred design and think about things worth considering. It aligns nicely with STEMx projects grounded in improving the human experience. Mitch Resnick, director of Lifelong Kindergarten at MIT's Media Lab, suggests educators should incorporate the process of creative thinking – imagine, create, play, share, reflect (Resnick, 2007) in their practices as it "reflects the natural way that young children learn and play" (Martinez & Stager, 2013). Design thinking and creative thinking align quite nicely!

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FACILITATOR GUIDE FOR MAKER DAY

CELEBRATING THE BEST GIFTS OF HUMANITY - THE ABILITY TO THINK WISELY AND TINKER CREATIVELY AND SHARE GENEROUSLY

Suggested Use: We used this document to help group facilitators understand their roles and responsibilities. All participants were organized into groups consisting of 4 participants and 1 facilitator.

Background

Maker Day 2013 is an invitation only event for educators that requires ALL participants to thoughtfully and fully engage in design thinking and creative problem finding. At the heart of the day is the Maker ethos which "values learning through direct experience and the intellectual and social benefits that accrue from creating something shareable" (Martinez & Stager, 2013). The goal of the day is to develop an approach to assist educators to integrate making and tinkering seamlessly into their classrooms.

Educators will be introduced to Design Thinking, Inquiry; Making; and Hands on, Experiential Learning through their active engagement in a small group, problem finding, design challenge (program sketch). Groups must use some of ALL the materials in their kits. They can also make a pitch to take materials from a shared pantry of items and tools. To be successful, group members must collaboratively and creatively imagine, design, prototype, tinker, and share solutions to the design challenge.

Your Role and Responsibilities

As a group facilitator, it is your task to

- Facilitate the design thinking process,
- Keep your group on task and on time
- Help your group make connections to the trades and professions
- Help your group select one design and build a viable prototype
- Reflect on their process and document it on the group trifold panel
- Discuss how their might integrate Making and Design Thinking into their practices

Please make sure you have a digital timing device with you … your phone or something … as you need to time / manage the Design Thinking Process activities.

Include your agenda for the day here … so facilitators can help keep activities on time.

Suggested Tips - How To Facilitate Your Group

1. Each group member will have been assigned to 1 of the 15 groups. Their group number is on their nametag that they received when they registered.
2. All participants with a numbered nametag are expected to actively and consistently participate in ALL group activities – there are NO watchers or lurkers.
3. When you registered, you received your group's kit. It is in a Staples bag. No one is to look at the contents within the bag until you share it with them at Step # 12. This is very important. If you show the kit too early, it may influence and limit project design ideas.
4. Please participate in the Low Fi Social Networking activity (8:30 – 9:00). You can begin to identify your group members, but it is NOT necessary at this stage.
5. After the "official" speaking / opening, Susan will invite the participants to find their groups, gather up some morning coffee and find a good place for their group work. You can work on either the first floor (be mindful of the restaurant's area) and in the basement area. Please do not stray too much further as you'll need access to the pantry of

materials and the tools, plus the videographer / media people will want to find you and your group.
6. Remind group members they can access coffee / tea and treats at any time during the day. There will be a stash of treats under the stairs at the basement level.
7. Read the Design Problem document to your group. Don't spend time discussing the problem at this stage, just tell your group members you will now lead them through the Design Thinking Process that will help them identify a possible solution
8. Tell your group that once you start the Design Thinking Process, it will take 90 minutes and there will be no breaks. Encourage your group to take a bio break before starting the Design Thinking Process activity
9. Follow the Design Thinking script. You have a Facilitator's Guide in your Kit and you have worksheets for each of your group members. Distribute the worksheets and tell your group not to look ahead and to just follow your lead.
10. Facilitate the Stanford's dSchool Design Thinking Process --- 90 minutes
11. Lunch – food will be set up under the stairs at the basement level. Once you have completed the Design Thinking activity and shared the various solutions, you can invite your group to pause and gather their lunch and bring it back to your group area. Invite them to glance at the pantry and the tool area as they gather their lunch.

LUNCH NEEDS TO BE EATEN WITHIN THE GROUP – *it's a working lunch*

1. Show your group the Kit items and determine which of the solutions the group is going to develop to the prototype stage.
2. Start building the prototype.
    - Tell your group that they need to use some of all the items in the kit, and tell then they can make a pitch to use some of the items from the pantry.
    - Encourage them to work with Nancy in the tool area. This is an important element of the experience.
    - Remind the group of the design criteria from the Design Problem
        - Tool must be hand-held
        - Tool must be able to satisfy one of the following identified concerns:
            - Getting dressed
            - Transportation/travel
            - Personal Security
            - Carrying purchases
            - Paying for purchases
        - Tool must be unique yet usable and address a need
        - Tool aligns with the Engineering mantra - Make it smaller, make it stronger, make it do more, make it easy to use, make it cheaper, make it clean, make it green.
3. Explain the purpose of the documentation process using the trifold panel
    - The panel is to document the group's progress through the design thinking process: define, research, ideate, prototype, choose, implement, and learn
    - Each group has total creative license with the production of their panel, but
        - 1 panel should annotate the group's copy / version of the Maker Manifesto
        - 1 panel should elaborate on its design process / prototype
        - 1 panel should share how group imagines it could integrate Design Thinking and Making in their professional practices in their schools

    Tell the group there are a couple groups with a few different items in their kits
4. Encourage the group to work hard, push for detail
5. Ensure everyone takes an active role in the work – no passive partners
6. Explain the Gallery Tour during the Wine and Cheese.
    - Each group needs to set up a table with its trifold panel and prototype
    - Trade off as to which one of the group stays that your table to explain

7. Tell participants will receive access to Maker Day 2013 Online Toolkit. The toolkit will include all the resources used during Maker Day as well as photos / videos of the presentations, panels and prototypes.
8. Before enjoying the Wine and Cheese, please get your group to help you clean up your workspace.
    - If you have items that are reusable, please put them back in your kit or return them to the pantry. If items are too small or trash, please dispose of them in the proper recycling bins provided by UBC
    - Tools and materials in the kits will be reused by the Innovative Learning Centre
    - If group members have spare time, ask them to help Ian or Nancy help clean up the pantry and tool area

Thanks in advance for your facilitation … your efforts, energy, enthusiasm, attention to timing and process to make Maker Day 2013 a success!

DRAFT AGENDA

Suggested Use
You can modify this agenda to fit your event. However, please recognize the Design Thinking is truly a 60 – 90 activity that is important to the project success. Also, the development of the group presentation is essential for personal reflection on the activity.

8:30: Registration
9:00: Welcome by Hosts
9:15: Introduction to Design Thinking - Invited speaker
9:45: Linking Design Thinking, Trades, and Education – Invited Speaker
10:00: Formation of Groups and Morning Coffee
10:30: Start of project work
12:00: Working lunch
1:00: Project work continues
3:00: Preparation of Group Presentation (organization of design notes, preparation for sharing
3:30: Closing comments and Introduction to Gallery Tour Process
3:45: Gallery Tour and Closing Reception
4:30: DONE!

CREATING A DESIGN CHALLENGE OR PROBLEM SKETCH

Suggested Use
This document links Maker activities to school settings and introduces the use of a design challenge.

Whether you invite students into a maker project through (1) an inquiry question, or (2) position it as problem to be solved, or (3) cast it within a scenario, what aligns it to the Maker Movement is the intentional use of design thinking and the hands-on construction of a solution, using real tools and materials. A design challenge or problem sketch creates a narrative from which participants can use design thinking to find creative solutions to problems through empathy and research.

In a School Setting
When we bring the Maker approach into a school, we may want to guide the students using an inquiry orientation. Wiggins and McTighe (2006) offer guidance in approach in their book, Understanding by Design. Central to their approach is the suggestion of thinking with the end in mind. This has led to their work being called backward design as it considers the learning objectives, an approach, the use of materials and resources, and still allows the students to have an active role in determining individual aspects of the project and the ways in which it might be completed. The teacher has an active role in shaping the inquiry with the students and guides the students to use the available materials and resources within the specific context of the learning environment and curriculum under study.

Three Approaches to Forming a Design Challenge

1. Inquiry (Alberta Learning, 2004) allows curriculum to be explored through authentic experiences – a key contribution of MAKING to teaching and learning activities. Authentic learning encourages students to inquire into things that are real and of interest to them. It positions the learning activities as problems to be solved. Edutopia has a site sharing tools, tips and ideas about problem-based learning (PBL) (http://links.edutopia.mkt5094.com/ctt?kn=17&ms=NzE3NDM0OAS2&r=MjcyODg5NjI0MjMS1&b=0&j=OTMyNDg3NjYS1&mt=1&rt=0).

2. According to Mayer and Wittrock (2006), problem solving is “cognitive processing directed at achieving a goal when no solution method is obvious to the problem solver” (p. 287). They explain students need five kinds of knowledge to be successful problem solvers:
   - Facts: knowledge about characteristics of elements or events, such as “there are 100 cents in a dollar”;
   - Concepts: knowledge of a categories, principles, or models, such as knowing what place value means in arithmetic or how hot air rises in science;
   - Strategies: knowledge of general methods, such as how to break a problem into parts or how to find a related problem;
   - Procedures: knowledge of specific procedures, such as how to carry out long division or how to change words from singular to plural form; and
   - Beliefs: cognitions about one's problem-solving competence (such as “I am not good in math”) or about the nature of problem solving (e.g., “If someone can't solve a problem right away, the person never will be able to solve it”) (Mayer & Wittrock, 2009).

3. Scenarios are a form of story or narrative. They can be used to introduce students into a project. The purpose of a scenario is set a scene for a project and to create a common starting point. A scenario can also get the parameters for the project, outlining any

limiting factor, special conditions and time / context constraints. Scenarios are creative ways of imagining a "different future" or an alternative way of doing something. They help the students visualize the context for the task as they usually cover environmental, social, technical, political and economic concerns.

The sample task (Appendix 1) uses a problem sketch approach. The component of the problem sketch help frame a task within the following:

- background (Overview)
- context (Design Rationale),
- scenario (Problem Scenario),
- character for assessment / evaluation (Success Determinants), and
- rules / limitations (Parameters)

Martinez and Stager (2013) suggest there are eight elements of a good project. The following list is modified from their book and Gary Stager's web resource.

1. **Purpose and Relevance**
   Is the project personally meaningful? Does the project prompt intrigue in the learner enough to have him or her invest time, effort, and creativity in the development of the project?

2. **Time**
   Sufficient time must be provided for learners to think about, plan, execute, debug, change course, expand, and edit their projects. Class time affords students equal access to expertise and materials; projects may also need sufficient out-of-school time.

3. **Complexity**
   The best projects combine multiple subject areas and call upon the prior knowledge and expertise of each student. Best of all, serendipitous insights and connections to big ideas lead to the greatest payoff for learners.

4. **Intensity**
   Children have a remarkable capacity for intensity that is rarely tapped by the sliced-and-diced curriculum. Projects provide an outlet for the exercise of that intensity. Think about how long kids can spend mastering a video game, reading a favorite book series, memorizing the attributes of Pokémon, or building a tree house, and you have a good template for successful project-based learning.

5. **Connected**
   During great projects students are connected to each other, experts, multiple subject areas, powerful ideas, and the world via the Web. The lessons learned during interpersonal connections that are required by collaborative projects last a lifetime.

6. **Access**
   Students need access to a wide variety of concrete and digital materials anytime, anyplace. Personal student laptops make this possible, but we also need adequate access to craft materials, books, tools, hardware, software, and Internet access that allow learners to follow paths we may never have anticipated.

7. **Shareable**
   This is the big idea of project-based learning! Students need to make something that is shareable with others. This provides a great deal of motivation, relevance, perspective making, reciprocal learning, and an authentic audience for the project.

8. Novelty

Few project ideas are so profound that every child needs to engage in its development in every class, or year after year. Yes, that means that it may be time to rethink the annual marshmallow adobe project. If one student makes a fantastic discovery during a project, others can learn from it without slavishly repeating the steps of the pioneering student. In a healthy community of practice, learning continues and knowledge is shared naturally without coerced repetition (http://stager.org/articles/What%20Makes%20a%20Good%20Project.pdf)

In a Maker Space

Not all Maker activities start with a problem sketch or a challenge. Typically at non-profit or commercial Maker Spaces, individuals come to a site like the TechShop in Menlo Park, CA (one of the first and started in 2006) with a project they would like to work on or a tool they would like to learn.

For example, the Maker Space in the Chelsey Market in New York City (http://makezine.com/2013/09/14/summer-of-making-in-nyc/) posts projects that people can do, lists the price for the activity, and has people sign up to work in a facilitated group. The price includes expert help, all materials, and a set time for project completion.

APPENDIX 1 - DESIGN CHALLENGE: OUR AGING SOCIETY

Overview
In 2011, Human Resources and Skills Development Canada reported that 15.3% of British Columbia's population was classified as aged (age 65 and over). It also predicted that this population would increase to 23.8% by 2036. As a result, there is a real concern about providing support structures for these citizens.

Design Rationale
The population of BC prides itself on being mobile, whether it is by driving, riding public transportation, biking or walking. Mobility is important for many reasons, including shopping, accessing health care, and participating in social gatherings – just to name a few. Research suggests aging in place is beneficial on many levels, but experience tells us that as people age it becomes increasingly difficult to satisfy their need to enjoy the activities that make life rewarding as well as participate in everyday tasks.

Problem Scenario
Your team has been selected to develop the prototype of a tool that will help this identified population with their need to get out of their homes and participate in public outings.

This tool must be hand-held and be able to satisfy one of the following identified concerns:

- Getting dressed
- Transportation / travel
- Personal Security
- Carrying purchases
- Paying for purchases
- Shopping for food, clothing, other personal items
- Maintaining their homes – basic repairs, gardening, etc.

Success will be determined by
- Uniqueness and usability of the tool
- Alignment of the prototype with the design
- Ability of your tool to help the elderly get out and about
- Alignment to engineering design motto: "Make it smaller, stronger, do more, be easier to use, be cheaper, be clean, be greener"

Parameters
- You must use each of the items in tool kit in some way
- You may make a pitch to use the materials found in the Pantry.
- You should use the tools located in the Shared Tool Area

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CHECKLIST FOR PLANNING A MAKER DAY

This checklist (and prompts) helped to organize Maker Day 2013. While every effort has been made to make this checklist as complete as possible, due to the unique nature of such events, it may not cover every possible step required or answer every question. On the other hand, it may be too detailed for some events being planned. Generally, always prepare the most detailed plans necessary to suit the event being planned.

To Begin:

☐Set your date and agenda for the day - start early.
☐Secure your venue as soon as possible — determine any services, permits and permissions required.
☐Develop a budget and monitor your spending.
☐Determine whether funding or sponsors for the event may be required – IF so, start proposal writing and connecting with potential sponsors as soon as possible.
☐Develop an agenda for the day with a work-back schedule for each key action on your agenda (i.e., set-up of venue, greeting/registering participants, opening the day, coffee breaks and food, capturing the day, grouping participants and facilitators, design thinking process, prototype building, reflecting on the day, clean-up of venue, debriefing / evaluating the day, etc.).
☐Develop a list of volunteers, facilitators, guest speaker(s), sponsors / funders, special guests, and participants.
☐Develop a communication plan from your work-back schedule and lists of people involved to set key pre-events, roles and responsibilities (i.e., marketing, volunteer meetings, facilitator trainings, guest speaker(s) topics / times, invitations, confirmations, reminders, etc.)
☐Determine key milestones and set times to review whether 'the plan' is on track (i.e., adjustments need to be made (i.e, change in venue, participant numbers, guest speaker(s), problem sketch), steps need to be added, more / less feedback required, communication is happening, budget needs adjusting, more / less marketing, etc.)

Pre-event Planning:

☐Set-up of venue: sketch floor plan(s) for the day, list equipment required, chairs / tables, who will set-up, what time will set-up happen on the day, number of volunteers required, parking paid or free, other transportation required.
☐Greeting/Registering: any marketing required (posters, radio / TV announcements, newsletter insertions, newspaper ads, PAC agenda item, etc.), how will lists of participants be monitored, what will the invitations say and look like (i.e., emails, letters, website registration, contacts, etc.), how will participants register, when will reminders be sent, name badges for the day, groups determined, etc.
☐Opening the day: ice breaker activities, meet and greet, coffee / snacks at beginning, speaker topics / time to speak confirmed, guest speaker(s) invited, confirmed, MC necessary, formal or informal opening, special guests to be welcomed officially.
☐Coffee breaks and food: who will take charge of coffee, tea, drinks, snacks and lunch, ordering, catered event, pot luck, working lunch, how will food allergies and / or special diets be addressed (i.e., part of invitation, specific person to contact) a work-back schedule for each key action (i.e., facilitators, invitees, problem sketch, kits and pantry, food, etc.).

☐Capturing the day: will video, audio or pictures be taken, who will be responsible for media and distribution, what will happen with prototypes (i.e., participants take them home, displays will be available after the event, transportation of prototypes to where they will be displayed), consent forms required, what would sponsors and / or grant funders require after the day.

☐Grouping participants with facilitators: how many participants in a group (best to consider even numbers — 4 or 6 participants per group and facilitator — since working in pairs is part of the design thinking process), who forms the groups, when do groups form on the day of the event, how will facilitators meet up with participants on the day, are areas assigned to groups or may groups chose their space, have a plan of how to combine groups IF a participant or facilitator is not available on day of event.

☐Design thinking process: who develops the problem sketch, how/when will facilitators be trained, who will be responsible for photocopying and distribution of materials, pens / pencils /coloured markers.

☐Prototype building: what will be in the design kits, pantry and / or tool crib, who will do the purchasing of materials, who will be responsible for building the design kits, pantry, and / or tool crib for the day, when will kits be distributed to facilitators, who helps in the pantry, who helps with the tool crib, any special rules and / or regulations required to be posted for the day.

☐Reflecting on the day: how many three-fold presentation panels required, what materials will be available for this activity (i.e., coloured construction paper, coloured markers), who will organize the Gallery Tour and ensure every group is ready to present, what do participants need to know about the Gallery Tour, how long will the tour take, formal or informal presentations.

☐Clean-up of venue: who is responsible for clean-up of venue, who is responsible for removal / transportation of prototypes and three-fold presentation panels, what happens to leftover food, who takes responsibility for collecting / distributing / storing design kits, pantry and / or tool crib.

☐Debriefing / evaluating the day: what have sponsors / funders requested, formal or informal process, what would a ‘successful’ day look like, what might be done differently, what worked, what required adjustments, what are participants saying.

☐Other:

☐Other:

☐Other:

ita
YOUR TICKET.

MAKER DAY 2013

PARTICIPANT GROUPS' KIT CONTENTS

Suggested Use
The following is a list of the basic items provided in the Tool Crib. The quantities supported 12 groups with 4 participants / group. Each group made one prototype project solution to the design challenge.

Item	Quantity	Note	Suggested Source
Drills	3	Cordless electric drills are best.	Building supply store
Drill bits	1 package	Bit Pack with 10 various bits	Building supply store
Dowels	15 lengths of various thickness	Individual lengths could be pre cut	Building supply store
Hand saws / hack saw	3		Building supply store
Hack saw blades	1 package – finer blade		Building supply store
Small magnets	Package of mixed sizes	Consider sheets of magnets that can be cut	
Styrofoam	Small pile	Use recycled Styrofoam from packing	Recycling centre
Cardboard	Small pile	Sheets of various thickness	Recycled cardboard from Costco
Washers	1 box	Small size	Machine shop
Cotter pins	1 box	Small box of mixed sized pins	Princess Auto
Nuts and bolts	1 box	Small box of mixed sized pins	Princess Auto
Velcro	1 box	Velcro can be cut into appropriate lengths	Princess Auto
Hinges	10 sets		Building supply store
First Aid Kit	1	Basic Kit	Building supply store Medical supply store Outdoor store
Mitre Box	1		Building supply store
Portable vice	1	Essential as it makes cutting safer	Building supply store
Vinyl Electrical Tape	3 rolls	Comes in red, yellow and green – variation from black / grey duct tape	Building supply store
Plastic (PVC) pipe cutter	1		Building supply store
PVC (1") – 90 degree joiners	15		Building supply store
PVC (1/2") – 45 degree joiners	15		Building supply store
PVC (3/4") – 45 degree joiners	15		Building supply store
PVC (1") – 45 degree joiners	15		Building supply store

Item	Quantity	Note	Suggested Source
PVC (1/2") – Tee joiners	15		Building supply store
PVC (3/4") – Tee	15		Building supply store
PVC (1") – Tee	15		Building supply store
PVC (1/2") – Cross	10		Building supply store
PVC (3/4") – Cross	10		Building supply store
PVC (1") – Cross	10		Building supply store
PVC (1/2") – Coupling	15		Building supply store
PVC (3/4") – Coupling	15		Building supply store
PVC (1") – Coupling	15		Building supply store
PVC (1/2") – Cap	10		Building supply store
PVC (3/4") – Cap	10		Building supply store
PVC (1") – Cap	10		Building supply store
PVC (1/2") – Adapter	5		Building supply store
PVC (3/4") – Adapter	5		Building supply store
PVC (1") – Adapter	5		Building supply store
PVC (1/2") – Swivel Adapter	5		Building supply store
PVC (3/4") -- Swivel Adapter	5		Building supply store
PVC (1") – Swivel Adapter	5		Building supply store
PVC (1/2") pipe	20' x 20 pieces		Building supply store
PVC (3/4") pipe	20' x 20 pieces		Building supply store
PVC (1") pipe	20' x 20 pieces		Building supply store
PVC (3") – sewer pipe	10' x 5 pieces		Building supply store
PVC (3") – perforated pipe	10' x 5 pieces		Building supply store
PVC (4") – sewer pipe	10' x 5 pieces		Building supply store
PVC (4") – perforated pipe	10' x 5 pieces		Building supply store
PVC (3") – cap	10		Building supply store
PVX (4") – cap	10		Building supply store
Respirators	1 box		Building supply store
Rubber gloves	1 box		Building supply store

AN ANNOTATED REFERENCE LIST

Suggested Use
These references are all valuable supports for your Maker Day. You may want to show the Apollo 13 videos as support for lateral thinking – thinking that prompts different approaches to problem solving.

Videos to Watch

- Apollo 13 – Clip from the movie – Square peg in a round hole
  http://www.youtube.com/watch?v=C2YZnTL596Q

- The real story – Apollo 13
  http://www.youtube.com/watch?v=69LDSL-9--g

- Software to Explore
  Autodesk 123D (http://www.123dapp.com/)
  Free 3D modeling software that is integrated with content and fabrication services. It also has links to projects, patterns, models.

- Autodesk Inventor (http://www.autodesk.com/products/autodesk-inventor-family/overview) The professional, commercial version of Autodesk 123D. Inventor® 3D CAD software offers an easy-to-use set of tools for 3D mechanical design, documentation, and product simulation. Digital Prototyping with Inventor helps you design and validate your products before they are built to deliver better products, reduce development costs, and get to market faster.
- Lego Building Software (http://www.techsupportalert.com/content/best-free-lego-building-program.htm)

- Logo Software (http://el.media.mit.edu/logo-foundation/products/software.html)
  The original turtle programming software.

- Maya (http://www.autodesk.com/products/autodesk-maya/overview)
  Maya® 3D animation software offers a comprehensive creative feature set for 3D computer animation, modeling, simulation, rendering, and compositing on a highly extensible production platform. Maya now has next-generation display technology, accelerated modeling workflows, and new tools for handling complex data.

- Scratch (http://scratch.mit.edu/)
  With Scratch, you can program your own interactive stories, games, and animations — and share your creations with others in the online community. Scratch helps young people learn to think creatively, reason systematically, and work collaboratively — essential skills for life in the 21st century. Scratch is a project of the Lifelong Kindergarten Group at the MIT Media Lab. It is provided free of charge.

Hardware to Explore

- Arduino (http://www.arduino.cc/)
  Arduino is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software. It's intended for artists, designers, hobbyists and anyone interested in creating interactive objects or environments.

- littleBits (http://littlebits.com/)

littleBits is an opensource library of electronic modules that snap together with tiny magnets for prototyping, learning, and fun.

- Leap Motion (www.leapmotion.com)
  Leap Motion, Inc. is a company that manufactures and markets a computer hardware sensor device that supports hand and finger motions as input, analogous to a mouse, but requiring no hand contact or touching.

- Lego Mindstorms
  (http://www.lego.com/enus/mindstorms/?domainredir=mindstorms.lego.com)

- McMaster (http://www.mcmaster.com/#)
  Site for all types fasteners

Sites to Check Out

- Adafruit (http://www.adafruit.com/)
  Site for Adruino hardware and project ideas.

- Etsy (www.Etsy.com)
  Shopping site for a range of arts and crafts and collectables from global entrepreneurs

- Instructable (www.Instructables.com)
  A site to share what you make with others. Instructables has directions for a range of projects.

- Invent to Learn (http://www.inventtolearn.com/)
  Official site of the book, Invent to Learn. http://www.inventtolearn.com/resources/ lists a range of resources mentioned in the book

- Khan Academy (https://www.khanacademy.org/)
  A site to learn – just for free. The library of content covers math, science topics such as biology, chemistry, physics, and the humanities with playlists on finance and history.

- Kickstarter (www.kickstarter.com)
  Kickstarter is the world's largest funding platform for creative projects.

- Lynda (www.Lynda.com)
  Subscription fee to learn software skills

- SpakrFun (https://www.sparkfun.com/)
  Online retail store that sells the bits and pieces to make your electronics projects possible

- Thinkgiverse (http://www.thingiverse.com)
  Thingiverse is a website dedicated to the sharing of user-created digital design files. Providing primarily open source hardware designs licensed under the GNU General Public License or Creative Commons licenses, users choose the type of user license they wish to attach to the designs they share. 3D printers, laser cutters, milling machines and many other technologies can be used to physically create the files shared by the users on Thingiverse.

- Toys to Play Use
  Erector Sets (http://en.wikipedia.org/wiki/Erector_Set)

An Erector Set (the trademark has always been "ERECTOR") is a brand of metal toy construction sets, originally patented by Alfred Carlton Gilbert and first sold by his company, The Mysto Manufacturing Company of New Haven, Connecticut in 1913. In 1916, the company was reorganized as the A.C. Gilbert Company. Erector consists of various metal beams with regular holes for assembly using nuts and bolts. Other mechanical parts such as pulleys, gears, wheels, and small electric motors were also part of the system. What made Erector unique was the ability to build a model, then take it apart and build something else (over and over). Erector quickly became the most popular construction toy in the United States, most likely because it was the only construction set at the time to contain a motor. Erector was commonly referred to as an Erector Set, though erector set has become somewhat of a generic trademark denoting a variety of construction toys, irrespective of brand. The trademark for ERECTOR is owned and marketed by Meccano. It is still available at Toy R Us

Things to Read

- Invent to Learn - Making, Tinkering, and Engineering in the Classroom (http://www.inventtolearn.com/), by Sylvia Libow Martinez & Gary Stager
  Using technology to make, repair, or customize the things we need brings engineering, design, and computer science to the masses. Fortunately for educators, this maker movement overlaps with the natural inclinations of children and the power of learning by doing.

- Make Magazine (http://makezine.com/)
  Designed after Popuar Mechanics, Make Magazine is the go to site for all things Maker – from ideas to tools.

- Wired magazine (http://www.wired.com/magazine/)
  A subscription magazine (digital and print) that reports on emerging tools, technologies and trends. The recent issue has a feature on education and fostering the next Steve Jobs (http://www.wired.com/business/2013/10/free-thinkers)

- Yes & Yes Designs

Places to Go

- MIT Center for Bits to Atoms (http://cba.mit.edu/about/)
  MIT's Center for Bits and Atoms is an interdisciplinary initiative exploring the boundary between computer science and physical science. CBA studies how to turn data into things, and things into data.

- MIT Media Lab – Lifelong Kindergartner (http://llk.media.mit.edu/)
  The home of Scratch – Mitch Resnick and his team design tools and software to support design, creation and learning.

- Stanford's Hasso Plattner Institute of Design – d.school (http://dschool.stanford.edu/)
  Home of design thinking … The school was founded by Stanford mechanical engineering professor David Kelley in 2004. It is a joint project between the university and the Hasso Plattner Institute of University of Potsdam in Germany. Like some other design schools, it integrates business and management training into more traditional engineering and product design education.

- Maker Space in the Faculty of English – Humanities - http://maker.uvic.ca/

The Maker Lab in the Humanities at the University of Victoria opened its doors in September 2012 under the direction of Jentery Sayers (Assistant Professor, English). With research priority areas in physical computing, desktop fabrication, versioning, and scholarly exhibits, it intersects cultural criticism, computation, and comparative media studies with tacit learning, multimodal communication, and experimental methods. As the Lab's name suggests, its design is anchored in blending a humanities research lab with a collaborative makerspace — a design that affords its team of graduate students and faculty opportunities to build projects through various modes of knowing by doing (e.g., programming, markup, data modeling, 3D printing, speculative design, prototyping, and new media production). - See more at: http://maker.uvic.ca/about/#sthash.FkFnrTU0.dpuf