CIRCULAR ECONOMY IN ACTION

Interactive resources for professional development workshops

V2

Ellen MacArthur Foundation in partnership with Cranfield University, TU Delft, University of Exeter and University São Paulo
INTRODUCTION

Intentionally, this publication is a work in progress. Trying to be true to the idea of iteration and feedback as keys to effective learning, we have published these workshop activities in a way that allows us to update the files online and incorporate your feedback. The project development team drafted these activities and piloted them in various professional development settings during 2016 /20171. The main publication, available in digital format contains the basics: what the activities are designed to do; how to deploy the activities; and thumbnail size versions of the workshop resources. These resources are designed for print or PowerPoint use, since face to face workshops often use group work around images, graphics, objects, data and so on. All of these activities are designed for interactive workshops not information giving per se and none of them are intended to provide ready answers, or detailed briefings. Rather, they are to encourage participation, dialogue and perhaps reflection around moving forward...they are about asking the right questions.

The obvious point is that the workshop facilitator requires a good understanding of the background to the activity to enable an optimal experience in professional development settings. So, as well as the basics in this main publication, there is the project website where additional background and relevant facilitators guidance is provided - and where your feedback about using these activities can be left to assist the work of the originators of the activities. The project website also features the high resolution, downloadable workshop resources and has been designed to enable frequent updating of the activities - these may be changed and updated without prior notice. Formally updated versions of activities carry numbering after the fashion of software upgrades. Tweaks are 1.00 1.01 1.05 etc. Substantial changes are 2.00 and so on.

The activities prompt questions across the spectrum of a broadly conceived notion of a circular economy. Questions such as: “What is the real problem we are trying to solve here?’’ Or “How far does this create value and where does it go?’’ “Does this create costs?’’ “Can there ever be a fully closed loop for materials?’’ Or “What would it take to make this business model successful?’’ ”Is this about circularity as if it were a plumbing system, the aim is trying to stop leaks? Or is it about an ecosystem that is inherently ‘leaky but nutritious’?’’

1 See Appendix 1 for an example professional development workshop held with 30 academic staff at University of São Paulo, September 2016 - a selection of these activities were piloted at this event.
The circular economy is most often associated with materials and resources (energy) stocks and flows but this curriculum development project takes its cue from Kenneth Boulding who argued that an economy should be seen as composed of knowledge/information, materials and energy. This includes conventional economic information around money, markets, prices and costs.

The circular economy is part of a contemporary debate about the boundaries and role of economics; it uses the idea of an embedded economy, one which exists in the context of dynamic, interdependent social and environmental systems as its starting point. It is in contradistinction to a linear 'take-make-dispose' economy, one which degrades natural and social capital, and one that is so evident today. From a systems perspective, a circular economy explores, amongst other things, the design of products, components and materials. And of course it explores the systems within, which can be integrated in a way which are regenerative and restorative to natural and social capital - as a way of creating additional value. As such, the ideas of stocks, flows and feedback and understanding the context, and consequences of any economic activity are both vital, and obvious.

Characterised as an umbrella concept, the circular economy tends to use creative and critical thinking that involves the bigger picture, the longer term, all scales, and dynamic, not static, equilibrium. Thus it is part of a shifting ‘worldview’ based on contemporary science which has been underway for many decades - a circular economy, at its best and most effective, shares in that ‘framework for thinking’. This is a compelling reason for designing these activities and their resources, primarily, around workshops. It is, surprisingly, not the relative novelty of circular economy which is problematical here. As economist John Maynard Keynes wrote:

“The difficulty lies, not in the new ideas, but in escaping from the old ones, which ramify, for those brought up as most of us have been, into every corner of our minds.”

Workshops in a ‘feedback rich’ setting are often based around challenges, creating uncertainty, raising doubts and facing contradictions or inconsistencies in our minds as one way of loosening these habits of thought. The old ideas are so embedded that merely being informed of some new, if startling facts will make little or no difference. Process and context together can be fruitful, drawing in knowledge as required. Kenneth Boulding again: “Theories without facts may be barren, but facts without theories are meaningless.” We would add: learning without understanding is ephemeral.

A visual representation of the notion of a circular economy is shown in Figure 1. For a broader discussion on circular economy origins, definitions and criticisms see the review paper by Vasileious Rizos and colleagues (Rizos et al, 2017).

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<th>MATERIALS</th>
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<td>WASTE = FOOD - BIOLOGICAL</td>
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<td>MONEY = MEDIUM OF EXCHANGE</td>
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<td>DIVERSITY = STRENGTH</td>
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- The circular economy can be explored through a number of identities and one related shift. In a circular (feedback-rich) system the endless transformation means that one side of the equation has an intimate relationship with the other if it is to ‘work’ optimally as a system
- Using the three categories of materials, energy and information and informed by systems thinking, the four identities fall into place

Source: Webster, 2017
THE WORKSHOP ACTIVITIES AND USE OF TWO COMMON TEMPLATES

The template below in box 1 fits a PowerPoint slide or handout and could be used by the facilitator to introduce a particular activity. This ‘introductory template’ carries basic information about the context, (suggested) resources to use, tasks and timings.

Perhaps unusually, the template for introducing the workshop activity does not include the overall aims of the exercise. The rationale for this approach is that the introductory PowerPoint slide or handout is for the facilitator not to cue the actual outcome from the beginning of the session. The general aim, detailed facilitators guidance notes, downloadable high-resolution resources, references and further reading for each activity are in the online support material as indicated in the template in box 2.

OUTLINES OF THE WORKSHOP ACTIVITIES

A SANDWICH, A BUTTERFLY AND A CAKE! - A CIRCULAR ECONOMY: to give an early introduction to the circular economy overall. This activity emphasises the importance of ‘big picture’ - of science, design, business and setting system conditions. It is based on the idea of an economy as material, energy and information stocks, flows and feedback.

MATERIALS FLOWS, THE BIG PICTURE: this activity is based on a well-illustrated framework: a photo of an aluminium smelter; material losses associated with smelting; a sankey diagram of aluminum flows; and a cartoon by Walter Stahel to illustrate what happens to resources used in an aluminium can over several cycles. The theme of the session is ‘big picture’ flow and location (the consequences of feedback in different contexts). Can aluminium be ‘closed-loop’? When, if at all? How? Does it matter?

EXPLORING SYSTEMS DYNAMICS - A SIMULATION: this activity considers how complex adaptive systems behave when the ‘rules of the game’ are changed. The simulation enables and enriches a discussion of the key characteristics of complex systems such as interconnectedness, compound causality, tipping points and phase transitions, resilience and ‘dynamic equilibrium’. This experience of the abstract model can then be applied to (the transition to) a circular economy, deepening consideration of stocks, flows, feedback and change in general.

THREE STORIES ABOUT SCALE, SELLING AND ACCESS OVER OWNERSHIP: can many of the problems associated with economies of scale and selling to consumers be fixed by smaller scale and shifting to use - to ‘access over ownership’? What happens if access over ownership is seen/ divorced from circular flows of materials and is short term?

NANO MEMBRANE TOILET – THROUGH 4 LENS OF CIRCULAR DESIGN: this activity puts into context the overarching dimensions of design thinking and circular economy needed to create a new mind set for design. It is based on understanding ‘four lenses’ of circular design. A ‘lab story’ from Cranfield University is used to prompt discussion on how we can re-think great inventions such as the toilet. The context is Cranfield University’s Nano Membrane Toilet which will be able to treat human waste on-site without external energy or water. There is a huge opportunity to create new mind sets for design to reinvent current structures and create regenerative systems that are accessible to all.

THE CIRCULAR ECONOMY IS IN THE CARDS: in order to achieve a complete circular business model, we need a systems change and wide collaborations across companies, sectors and regions. This activity encourages reflection on how, through different combinations, these circular business model components might affect material flows and/or product and component utilisation across the value chain. In this session, up to five guiding questions are offered to facilitate the discussion.

VALUES IN A CIRCULAR ECONOMY: the circular economy appears to offer a positive systemic model or framework for addressing some of the serious global and local economic and wider societal challenges confronting us in the 21st century - in ways that make sense. But, in reality, everybody understands and deals with a circular economy in a different way. The roots of these differences often lie in our personal values. This activity helps to clarify differing personal interpretations of a circular economy.

A DOUGHNUT FOR LATER?: this activity is based on understanding Kate Raworth’s two different approaches to thinking about economics - and their roots. But, as importantly, this activity helps reflection on the question: how far is the circular economy a materials and resources fix for the existing economy or is it part of not just a transition but a transformation in how we see the economy and what we expect from it? Or, indeed, can it be both - it is only time that separates the two? The answer to these questions matters because it informs the kind of ‘system conditions’ or ‘rules of the game’ which need to be applied to advance change.

CIRCULAR BUSINESS MODELS - THE BRANDED T-SHIRT CASE: this activity introduces workshop participants to the creation of a circular value proposition using the four building blocks, and gives hands-on experience of the challenge of re-designing a current real linear sales/ownership/disperse model to a potential circular model. The case involves cotton T-shirts and raises issues about the disposal of valuable product and materials well before economic, biological and technical life spans - a common issue in circular analysis.

COFFEE PRODUCTION AND CONSUMPTION SYSTEMS: this activity emphasises how, in the biological cycle, the circular economy is about value creation/ distribution and regeneration of natural and social capital through biological materials cascading and approaches such as business ‘enterprise stacking’. This workshop activity uses the coffee production and consumption system as a context to explore the notion of Knowledge+ (Biological) Waste = Asset (multifunctional through ‘cascading’). Discussion in this session is on coffee production at the farm level but includes extension work around coffee consumption and coffee ‘waste’ cascading within cities.

REFERENCES

A SANDWICH, A BUTTERFLY AND A CAKE! - A CIRCULAR ECONOMY?

WHAT ARE THE BOUNDARIES TO A CIRCULAR ECONOMY?

OUTLINE
To give an early introduction to the circular economy overall. This activity emphasises the importance of ‘big picture’ – of science, design, business and setting system conditions. It is based on the idea of an economy as material, energy and information stocks, flows and feedback. Links with the activity A doughnut for later?

RESOURCES AVAILABLE
* 1:R1a Intro PPT slide
* 1:R1 PPT build up in stages of a ‘circular economy’
* 1:R2 Card prompts
  - 6 items, one blank
* 1:R3 PPT ‘A sandwich, a butterfly and a cake’ proposal

TASK(S) AND RUNNING ORDER
1) Dialogue around classic ‘circular economy’ diagram build up. Why does it matter? Is it sufficient?
2) Consider in groups the 1:R/2 cards. Categorise them as ‘very relevant’, ‘perhaps relevant’, ‘marginal’ to CE. Add own item(s)
3) Feedback and debrief on the cards
4) Dialogue around 1:R/3 short slide set
5) Reflection: ‘Where do CE boundaries lie for you?’

ORGANISATION
- Plenary and dialogue around PPT
- Small group (4s) around card prompts
- Plenary debrief

TIMINGS
Overall approximately 85 minutes.
Task 1: 15 mins; Task 2: 20 mins; Task 3: 20 mins; Task 4: 15 mins; Task 5: 15 mins.

THUMBNAIL RESOURCES
DOWNLOAD HIGH RESOLUTION VERSIONS FROM WEBSITE
Could aluminium use be ‘closed-loop’?

The theme of this activity is ‘big picture’ flows and the consequences of feedback in different contexts. Can aluminium use be ‘closed-loop’? When, if at all? How? Does it matter? The main stimulus for this activity is a Sankey diagram that visualises the stocks and flows of aluminium internationally. Aluminium is a very significant metal in the global economy and in the discussion, participants are encouraged to reflect on ways to improve the prospects for aluminium in relation to creating more ‘circularity’.

**RESOURCES AVAILABLE**
- 2:R1a Intro PPT slide
- 2:R1 Photo of an aluminium smelter
- 2:R2 A Sankey diagram of aluminium flows
- 2:R3 A graphic to illustrate what happens to resources used in an aluminium can over several cycles
- 2:R4 Aluminium prices
- 2:R5 Aluminium flows - cars

**TASK(S) AND RUNNING ORDER**
1) In small groups develop dialogue around the aluminium smelter photograph and Sankey diagram
2) Consider in groups the graph about recycling and aluminium cans
3) Reflection: where would your emphasis go in improving the prospects for aluminium in relation to creating more ‘circularity’?

**TIMINGS**
Overall approximately 60 minutes.
Task 1/2: 40 mins. Task 3: 20 mins.
OUTLINE
To provide an experience of how complex adaptive systems behave. This simulation enables and enriches a discussion of their key characteristics such as interconnectedness, compound causality, tipping points and phase transitions, resilience and ‘dynamic equilibrium’. This experience of the abstract model can then be applied to (the transition to) a circular economy, deepening consideration of stocks, flows, feedback and change in general.

RESOURCES AVAILABLE
- 3:R1a Intro PPT slide
- Stickers with numbers written on them (1-20 or however many members the workshop group has). A minimum of 5 people is advisable. There is no upper limit
- Flipchart paper on a stand or whiteboard, with pens
- An open space large enough for the group to form a circle with one metre between each individual

ORGANISATION
Whole group activity. If there are more than 20 participating, split the group into ‘participants’ and ‘observers’. A small number of these observers can assist the facilitator by watching the progress of the activity and helping with the debriefing.

TASK(S) AND RUNNING ORDER
1) Arrange the group into a large circle. Each person secretly decides on two other individuals whom they will ‘follow’. Everybody begins to move to form an equilateral triangle with the two people they ‘follow’.
2) Remove one person from the whole group. Group moves around again. Debrief.
3) Change one of the ‘rules of the game’. Group moves again. Second debrief.
4) Reflect on the interconnected nature of the group.

TIMINGS
Overall approximately 45-60 minutes.
THREE STORIES ABOUT SCALE AND SELLING

Can the thinking behind a circular economy break the tyranny of ‘scale and sale’? Or did digital do that?

OUTLINE
In this activity the consequences of operating at scale are unpicked as a largely systemic driver of a linear economy. The logic which follows from ‘defeating’ both ‘scale and sale’ through higher utilisation of significant durables via a product as service model might be one key to being “at home in a modern world”. A case study of the innovative car company Riversimple is used to illustrate the possibilities and challenges. Lastly, the question of user protection is raised. How can shifting from ownership to use reflect not just resource benefits, but improve the rights of users? c.f. those conferred by ownership.

RESOURCES AVAILABLE
- 4:R1 Intro slide and Sequenced slide set - ‘Selling and scale’ and its consequences
- 4:R2a ‘Defeating selling and scale’ summary slide
- 4:R2 PPT Sequenced slide set - Defeating ‘Selling and scale’ by servisisation
- 4:R3 PPT Riversimple case study - slide set
- 4:R4 Riversimple video clip - 8 minutes in length
- 4:R4a Riversimple business model - 2 visuals

TASK(S) AND RUNNING ORDER
1(a) Introduction, how an industrial production system brings benefits (see Context)
1(b) Presentation and discussion with R1 PPT. The consequences of selling at scale discussed. Systemic cause of economic growth and resource and other related issues (externalised costs)
1(c) Presentation and discussion with R2 PPT. What happens when extended product life and higher utilisation replace ‘sale and scale’?
2) Riversimple story and film clip R3 PPT, R3a and R4. Example of thoroughgoing rethinking of production and business model to critique argument made in 1(c). Is it convincing?
3) Zooming out. Small group work around what might be needed to allow people to be comfortable around giving up ownership for access in various forms
4) Riversimple video clip

ORGANISATION
Presentation R1 with input as it proceeds - plenary
Presentation R2 with discussion at the end
Presentation R3 (case study) with video clip
Small group work and plenary debrief

TIMINGS
NANO MEMBRANE TOILET - THROUGH FOUR LENSES OF CIRCULAR DESIGN

WHAT ARE THE DIMENSIONS OF CIRCULAR DESIGN?

OUTLINE

This activity puts into context the overarching dimensions of design thinking and circular economy needed to create a new mindset for design. It is based on understanding ‘four lenses’ of circular design. A ‘lab story’ from Cranfield University is used to prompt discussion on how we can re-think great inventions such as the toilet. The context is Cranfield University’s Nano Membrane Toilet which will be able to treat human waste on-site without external energy or water. There is a huge opportunity to create new mindsets for design to reinvent current structures and create regenerative systems that are accessible to all.

RESOURCES AVAILABLE

- 5:R1a Intro PPT slide
- 5:R1 PPT explaining the four lenses of circular design
- 5:R2 Lab Story video - interviews with research team members
- 5:R3 Video story board card prompts - excerpts of the R2 video interviews
- 5:R4a and R4b A4 sheets for note taking and Card prompts with key questions about the four lenses of circular design
- 5:R5 Illustration of the Nano Membrane Toilet system configuration
- 5:R6 Full transcript of the video
- 5:R7 Diagram of a conventional sanitation system from Sanitation in the Circular Economy report

TASK(S) AND RUNNING ORDER

1) Dialogue around the PowerPoint R1. Why is it important to provide a reference point to circular design through these four lenses? What are the overarching elements of design thinking, systems thinking and circular economy that are important to create new mindsets for design?
2) Play the ‘Lab story’ video.
3) Use the video to discuss in small groups how each of the four lenses is considered in the design of the nano membrane toilet.
4) Feedback and debrief from each group to the plenary.
5) Plenary reflection: what other dimensions do we need to consider when creating new mind sets for design?

TIMINGS

Overall approximately 140 minutes. Task 1: 20 mins; Task 2: 20 mins; Task 3: 60 mins; Task 4: 20 mins; Task 5: 20 mins.

ORGANISATION

- Plenary and dialogue around PPT and the Lab Story video
- Small groups (4s) around Resource prompts R3 to R5
- Plenary debrief
THE CIRCULAR ECONOMY IS IN THE CARDS

WHAT DOES IT TAKE TO ACHIEVE A CIRCULAR BUSINESS MODEL?

Analysis points towards the fact that there’s not one single approach to embed circular economy in the business model, and there’s no fully circular business model example out there. In order to achieve a complete circular business model, we need a systems change and wide collaborations across companies, sectors and regions. This activity encourages reflection on how, through different combinations, these circular business model components might affect material flows and/or product and component utilisation across the value chain. In this session, up to five guiding questions are offered to facilitate the discussion.

RESOURCES AVAILABLE
- 6:R1a Intro PPT slide
- 6:R1 18 double-sided cards with business models components + examples
- 6:R2 PPT and R2a Slides and cards with Five Guiding Questions.
- 6:R3 Circularity and nine ‘Rs’

ORGANISATION
- Small groups between 2-5 people in each group
- Large board or wall space for presentation of small group card collections

TASK(S) AND RUNNING ORDER
1) Background and presentation of the session.
2) Presentation of the cards. Select 2/3 of the 5 Guiding Questions
3) Small group discussion
4) Feedback and debrief from each group to the plenary.
5) Plenary debrief. 15 minutes feedback to the room and discussion

TIMINGS
Overall approximately 80 minutes. Task 1: 10 mins; Task 1a: 5 mins; Task 2: 45 mins; Task 3: 20 mins.
VALUES IN A CIRCULAR ECONOMY

WHAT DOES THE NOTION OF A ‘CIRCULAR ECONOMY’ MEAN TO YOU? AND WHY?

OUTLINE
The emergence of the circular economy and the opportunities it presents have captured the interest of business leaders motivated by profit and business resilience, closely followed by policy makers, academics and educational leaders. The circular economy appears to offer a positive systemic model or framework for addressing some of the serious global and local economic and wider societal challenges confronting us in the 21st century – in ways that make sense. But, in reality, everybody understands and deals with a circular economy in a different way. The roots of these differences often lie in our personal values. This activity helps to clarify differing personal interpretations of a circular economy.

RESOURCES AVAILABLE
- 7:R1a Intro PPT slide
- 7:R1 Ten discussion cards
- 7:R2 One interpretation of a circular economy

TASK(S) AND RUNNING ORDER
1) Plenary briefing by the facilitator and split up in groups of ideally 6-8 participants
2) Discussion using the cards. Take about 15 minutes per card. Pick a new card when the discussion could benefit from new input again. In the wrap up, ask the groups to write down three main ‘takeaways’ from their discussion and bring these statements to plenary
3) In a plenary debrief, cluster and elaborate on the group feedback

TIMINGS
Overall approximately 60 minutes. Task 1: 5 mins; Task 2: 40 mins; Task 3: 15 mins.
A DOUGHNUT FOR LATER?*

CIRCULAR ECONOMY: PART OF A CHANGED PERSPECTIVE OR A PRACTICAL RESOURCES FIX? CAN IT BE BOTH?

OUTLINE
The activity is based on understanding Kate Raworth’s two different approaches to thinking about economics - and their roots. But, as importantly, this activity helps reflection on the question: how far is the circular economy a materials and resources fix for the existing economy or is it part of not just a transition but a transformation in how we see the economy and what we expect from it? Or, indeed, can it be both - it is only time that separates the two? The answer to these questions matters because it informs the kind of ‘system conditions’ or ‘rules of the game’ which need to be applied to advance change.

RESOURCES AVAILABLE
- 8:R1a Intro PPT slide
- 8:R1 The circular economy – a description (as evidenced widely)
- 8:R2 Large flip chart or presentation screen with core R1 messages and room to annotate
- 8:R3 Kate Raworth animations: Design to distribute; Change the goal - aim for the doughnut; Be agnostic about growth
- 8:R4 Kate Raworth animations: Design to distribute; Change the goal - aim for the doughnut; Be agnostic about growth
- 8:R5 PPT builds out into Kate Raworth’s 21st century economic thinking (modified and annotated)
- 8:R6 Summary diagram of 20th and 21st century economic thinking (modified and annotated)

ORGANISATION
- Small group discussions on a circular economy description
- Plenary and dialogue around two PPTs

TASK(S) AND RUNNING ORDER
1) Small group discussions on a circular economy description
2) Plenary discussion about the circular economy description. Followed by PowerPoint presentation (R3) about 20th century economic thinking (sequenced slide set)
3) PowerPoint presentation (R5) about Kate Raworth’s 21st century economic thinking (sequenced slide set)
4) Final plenary using the last slide of PowerPoint R5 to prompt discussion on whether circular economy is part of a changed perspective or a practical resources fix... or both.

TIMINGS
Overall approximately 70 minutes. Task 1: 15-20 mins after personal reading time of 3 mins; Task 2: 15 mins; Task 3: 10-12 mins for PPT 5 (plus optional 3x animations – 6 mins); Task 4: 15-20 mins.

* The reference in the title is to the ‘sandwich and cake’ analogy used in Activity 1. It is a further exploration, a snack for later.
CIRCULAR BUSINESS MODELS - THE BRANDED T-SHIRT CASE

HOW CAN WE USE THE CIRCULAR ECONOMY BUILDING BLOCKS TO CONSTRUCT AND MODEL CIRCULAR VALUE PROPOSITIONS?

OUTLINE
The starting position in this activity is that in order to move from linear to circular requires the deployment of a set or configurable actions known as ‘circular economy building blocks’. This activity introduces workshop participants to the creation of a circular value proposition using the four building blocks, and gives hands-on experience of the challenge of re-designing a current real linear sales/ownership/dispose model to a potential circular model. The case involves cotton T-shirts and raises issues about the disposal of valuable product and materials well before economic, biological and technical life spans - a common issue in circular analysis.

RESOURCES AVAILABLE
- 9:R1a Intro PPT slide
- 9:R1 PPT slide set: T-shirts, building blocks and business models
- 9:R2 Setting the scene
- 9:R3 Value creation and waste in T-shirt linear value chain
- 9:R4 The product design problem: the T-shirt branding issue
- 9:R5 The heart of the circular business model: prerequisites for capturing the value opportunity profitably
- 9:R6 Summary table of six clothing re-use or product extension models
- 9:R7 Background on textile/clothing disposal in UK to set the scene and the issue of T-shirts/Student unions in particular

TASK(S) AND RUNNING ORDER
1) Initial plenary and set up of ‘buzz’ groups
2) Consider in groups the linear approach to manufacture, retail and use of T-shirts and how this linear approach generates waste in the value chain
3) Consider in groups how to re-think or re-design the T-shirt to enable badges and visible logos to be removed cost effectively
4) Groups consider the prerequisites for the T-shirt circular business model to perform at least as well as the current linear case
5) Plenary to address unanswered questions and reflect on circular economy as a systems perspective

TIMINGS
Overall approximately 120 minutes. But can be extended or shortened depending on the group, prior experience, how much time is available and the use of any extension activities. Some suggested timings are:
Task 1: 20 mins; Task 2: 15-20 mins; Task 3: 20 mins; Task 4: 30 mins; Task 5: 15 mins.
COFFEE PRODUCTION AND CONSUMPTION SYSTEMS

HOW CAN BIOLOGICAL MATERIALS ‘CASCADEING’ GENERATE VALUE CREATION AND DISTRIBUTION OPPORTUNITIES AS WELL AS REGENERATING CAPITALS?

OUTLINE

This activity emphasises how, in the biological cycle, the circular economy is about value creation/ distribution and regeneration of natural and social capital through biological materials cascading and approaches such as business ‘enterprise stacking’. This workshop activity uses the coffee production and consumption system as a context to explore Idriss Aberkane’s (2016) notion of Knowledge+ (biological) Waste = Asset (multiple assets through ‘cascading’). The main emphasis of the discussion in this session is on coffee production at the farm level but includes extension work around coffee consumption and coffee ‘waste’ cascading within cities.

RESOURCES AVAILABLE

- 10:R1a Intro PPT slide
- 10:R1 PPT Slides of introductory data on coffee and Task 2 briefing illustrations
- 10:R2a-e Introductory data on sun-grown and shade-grown coffee (graphs, photos, map, tabular data)
- 10:R3 Spider diagrams illustrating some differences between shade-grown and sun-grown coffee production systems
- 10:R4 Task 2 handout/brief/’prompt drawings’
- 10:R5 Efficiency versus effectiveness graph by Sally Goerner

ORGANISATION

- Small groups with plenary session. Potential use of PPT to introduce background on coffee production
- Small groups work at tables with large sheets of flipchart paper - requires scissors, pens and paper glue for applying ‘prompt diagrams’, annotation work etc.

TASK(S) AND RUNNING ORDER

1) Small group discussion to introduce sun-grown and shade-grown coffee production systems
2) Small groups develop ‘circular value’ system diagrams to visualise a large farm that includes shade-grown coffee (through a circular economy lens using regenerative design principles)
3) Plenary on the small group discussions - everyone gathers around a gallery to view the small group systems diagrams
4) Plenary debrief to reflect on why shade-grown coffee systems are not yet at scale

TIMINGS

Overall approximately 90 minutes. Task 1: 15 mins; Task 2: 40-45 mins; Task 3: 15 mins; Task 4: 15 mins.
**APPENDIX 1**

**A circular economy keynote lecture and professional development workshop**

September 5-6, 2016, São Paulo University, São Paulo, Brazil

Workshop Facilitators: Ken Webster with Jo Miller, Luisa Santiago and Aldo Roberto Ometto

Project development team: Ken Webster, Craig Johnson, Jo Miller, Luisa Santiago, Aldo Roberto Ometto, Fabio Guerrini, Yovana Barrera and Victoria Almeida

**Brief description of workshop:** a professional development workshop featuring hands-on, interactive sessions and activities. The concept of the circular economy is presented in all its dimensions and opened up for dialogue. The workshop activities will be designed to encourage discussion, clarification and reflection around key circular economy themes. These include: the role of digital technologies in increasing value; new business models especially products as services; the relationship between circular economy and sustainable development; the enabling conditions for a circular economy; opportunities at all scales - the impact on the informal economy; educating for a circular economy; the role of systems thinking and especially insights from living systems and its applications in both the biological and technical cycles.

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<td><strong>30 minute BREAK in middle of this session-timing flexible</strong></td>
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<td><strong>12.15-1.30</strong></td>
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<td><strong>1.30-3.30</strong></td>
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This collection has been designed to encourage discussion, clarification and reflection within the context of a circular economy. Activities connect to themes associated with:

- understanding complex dynamic systems
- selling products as services and closing material loops
- creating multiple cash flows and rebuilding natural capital
- designing products, components and materials
- creating abundance rather than scarcity
- technologies, work and wages
- the meaning of participation in a circular economy

The various stimulus resources in this publication (with associated online downloads) are prompts and scaffolding for thinking and learning within professional development environments. They have been developed out of the experience of the Ellen MacArthur Foundation and the Technical University of Delft, Cranfield University, University of Exeter and the University of São Paulo.

Ellen MacArthur Foundation in partnership with Cranfield University, TU Delft, University of Exeter and University São Paulo.