Hanze
University of Applied Sciences
Groningen

# GUIDEBOOK LIVING LABS

## TOOL FOR DESIGNING AND EVALUATING LIVING LABS AT THE INTERFACE BETWEEN SCHOOL AND WORKPLACE


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## COLOFON

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**This document was based on:**


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- Hekman, E.G.A., Buikema H.W.M., Hoetink F. & Bomhoff, G.H. (2015). Eindrapportage Value beyond the Valley.
- Value in the Valley (2010). Het leerarrangement in de praktijk.
- Value in the Valley (2010). Evaluatie van het leerarrangement.


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# 1. INTRODUCTION

## AIM OF THIS GUIDEBOOK

Institutions for higher and vocational education increasingly seek collaboration with organizations such as businesses and governmental agencies in order to address challenges in professional practice and society. There are many ways of designing these 'living labs' and there are as many names for these new practices. They have been called, for instance, 'knowledge hubs', 'innovation labs', 'learning communities' or 'hybrid learning configurations[1]'.

This guidebook is intended to assist in the design and implementation of living labs. It can help decide what a living lab should look like and how it can be developed. It is not a checklist, but it is intended to be a source of inspiration for a dialogue about choices that must be made. It thereby makes these choices explicit. This dialogue also provides the basis for further development and implementation of the living lab. In short, this guidebook is intended as a tool for evaluating and (re)designing a living lab and for collaborative knowledge building.

## WHAT IS A LIVING LAB?

In a living lab two or more worlds merge and are transformed into one new practice. A living lab integrates education, research and professional practice and brings together different education programmes or disciplines.

Though there is not one perfect definition of a living lab, a workable definition is: '*a social practice around ill-defined, authentic tasks or issues whose resolution requires transboundary learning by transcending disciplines, traditional structures and sectors, and forms of learning*'[2].

The '*social practice*' is a hybrid environment or organization that has characteristics of the participating partner organizations (e.g. research, education, business, government).
The '*ill-defined tasks*' originate from professional practice or society.
'*Trans-boundary learning*' implies the acquisition and co-creation of knowledge across disciplines, sectors or perspectives.

This definition captures the most extensive form of a living lab, and it encompasses different forms and developmental stages of Living labs.

## WHY LIVING LABS?

Several goals of higher professional education are addressed in living labs. The first goal is to educate the 'professional of the 21st century', one who is able to create new knowledge collaboratively across boundaries of disciplines, professions and perspectives. Because these professionals will often have jobs that do not yet exist, they will be lifelong learners out of necessity.

Another goal is the innovation of professional practice by way of research and development. In Hanze University's 'Vision on education 2020' this is expressed as follows: "Hanze University of Applied Sciences (Hanze UAS) is a professional learning community that educates and trains individuals who are capable of conceiving innovative solutions to unfamiliar situations and complex problems. […] They have the courage to step out of existing frameworks and traditional roles and build new and surprising bridges between education, research and practical application. Rather than being an impediment, their individual differences are a springboard to pioneering collaboration. Learning and

working remain connected throughout life. […] All participants in the learning community collaborate in finding solutions for regional, national and international challenges. This creates living labs in which students, researcher-lecturers, and partners in the professional fields can realise their highest potential. […] The members of the learning community spur each other on during this process and are encouraged to discover and use their hidden qualities[3].”

1 Cremers, Wals, Wesselink & Mulder (in-press). Design principles for hybrid learning configurations at the interface between school and workplace. *Learning Environments Research*.
2 Cremers, Wals, Wesselink, Mulder (in-press)
3 Onderwijsvisie 2020 Hanzehogeschool Groningen (2014)

# 2. DESIGNING LIVING LABS

The design of a living lab is shaped by the **starting points**. There is always some ***motive*** or ***urgency*** for starting a living lab, and its ***aims and ambition*** can be deduced from it. The aims and ambition are also determined by the ***context and prerequisites*** (i.e. the participating partners, the position of the living lab, and the available ***resources***, such as people and funding). All of these starting points determine the intended outcomes.

The **outcomes** can take the form of

- ***(knowledge) products***, such as research results, advice, designs, prototypes, products, procedures, guidelines, etc.
- ***(personal and professional) development*** of individuals, teams, organizations and networks
- ***sustainable impact***, which is the lasting impact of the living lab in society which might include innovation, transition and sustained learning.

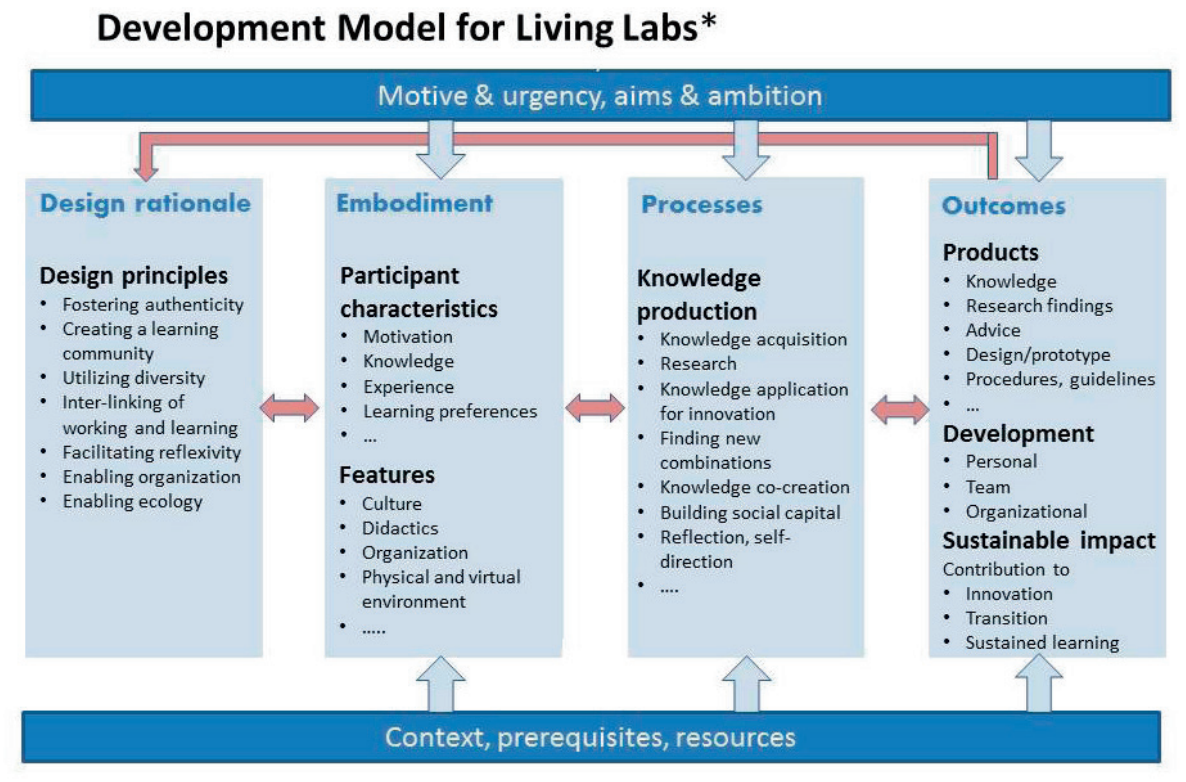
The outcomes are brought about by **processes** of knowledge production. Examples of such processes are: acquiring and applying knowledge, research, finding new combinations, co-creating knowledge and products, building social capital, reflection, self-directed learning, etc.

The living lab is designed and implemented in such a way that it can accommodate these processes. Among the **features** of a living lab are: characteristics and roles of the participants, the working culture, the organisation, educational activities, the physical and virtual environment, etc.

The design and implementation is underpinned and framed by a set of **design principles** for living labs.

All of the elements or variables mentioned above can be captured in a 'Development Model for Living Labs'. The variables are all interconnected; they influence one another, and in the course of developing a living lab they will change in coherence[4]. The process of developing a living lab is cyclical or spiral rather than linear.

4 A living lab can be considered a complex system. See e.g. Snowden, D.J. & Boone, M.E. (2007). A leader's framework for decision making. Harvard Business Review.




*Based on **'Ontwikkelingsmodel leerwerkarrangementen'**, G.H. Bomhoff & E.G.A. Hekman (2015). Eindrapportage Value beyond the Valley; Sandoval, W. (2014). Conjecture mapping; an approach to systematic educational design research.

# 3. DESIGN PRINCIPLES

This guidebook was based on a set of seven design principles for living labs. These principles are presented and described in the following textbox. They were derived from theoretical concepts (from the field of learning and organizational science) and practical experience of lecturers and educational consultants. The design principles were then evaluated and refined via the method of educational design research[5]. This set was used as the starting point for this guidebook. It is possible, however, to extend or adjust it as a result of using the design principles in practice.

The design principles do not provide a ready-to-use recipe for designing and implementing a living lab. There are different ways in which they can be implemented into practice. As mentioned above, the choices to be made depend on the starting points, such as aims, ambition and resources, and on desired processes and outcomes. A detailed description of the starting points, desired processes and outcomes can facilitate comparisons of different living labs and enable designers to learn about them.

In the following chapter the Development Model for Living Labs will be illustrated by way of an example, the living lab ‘Value in the Valley’. This lab was initiated by two Dutch institutions for vocational education (which are called ‘MBO’ in Dutch) and two universities of applied sciences (‘HBO’ in Dutch) in collaboration with two companies. The set of design principles in the Development Model was developed within Value in the Valley.

5 Cremers, Wals, Wesselink, Mulder (in press)

## DESIGN PRINCIPLES FOR LIVING LABS

Note: 'Participants' can be students, lecturers, researchers, practitioners, etc.
'Working' is understood as carrying out professional activities about which or by which knowledge is created. This might include researching, advising, designing, constructing, acting[6].

### Fostering authenticity

Working/learning environment (context, tasks, activities, roles, and communication) reflects working practice, a professional working culture and organization.

### Creating a learning community

Community: every member should experience a sense of belonging to the community.
Learner equity: every member of the community is a learner, each at their own level.

### Utilizing diversity

Diversity is built-in, valued and utilized both at team and organizational levels and in internal and external networks.


### Inter-linking of working and learning

Participants learn by performing real life tasks that are supported by educational interventions. These interventions are attuned to the task and to the individual learner, and they inter-link working and learning.

### Facilitating reflexivity

Participants learn by reflection on tasks and experiences as a person, team and organization. Critical events in the working activities are the starting point for reflection and learning.

### Enabling organization

The organizational structure and culture supports the working process, knowledge creation and sharing at every level (individual, team, organization, society).

### Enabling ecology

The living lab is attuned to its surroundings, which includes partner organizations and other stakeholders.

6 Losse, M. (2012). Verbinding tussen onderzoek en onderwijs. Presentation Facta conference 11 december 2012.

# 4. THE DEVELOPMENT MODEL APPLIED TO A LIVING LAB

In this section, the Development Model for Living Labs is applied to the example of 'Value in the Valley'. First the starting points are described (4.1), then the outcomes are characterized (4.2). The processes (4.3) and design principles (4.4) follow.

## 4.1 STARTING POINTS

### MOTIVES & URGENCY, AIMS & AMBITIONS

*Value in the Valley aims to contribute to sustainable development in the fields of environment, energy, agriculture and technology in the Northern region of the Netherlands.*
*Our aim is to provide clients with good solutions to their problems and to help students learn from the process. The assignments should have a certain level of complexity (preferably research assignments) and require a multidisciplinary approach.*
*In addition, an educational goal is to develop models and tools which can be used for developing living labs in other contexts. To this end, learning outcomes and usability of the living lab are evaluated each semester, and its design and implementation are adjusted accordingly.*

### CONTEXT, PREREQUISITIES AND RESOURCES

*The living lab is initiated by two Dutch MBO and HBO institutions in collaboration with two companies. Participants are students, lecturers and educational consultants from the four educational institutions, participants from two technical companies and a secretary. The living lab is located at a business park. Faculty members work part-time as project team members. They act as coaches, instructors, experts, acquire assignments, and they are also learners. The assignments are from (preferably actively involved) regional clients.*
*The students work in multidisciplinary and 'multi-level' (MBO and HBO) teams on real-life assignments that involved issues of sustainability. They have the roles of advisor and learner.*
*Depending on their study programme, students can participate in the living lab as a substitute for certain programmed courses. The learning outcomes of the substituted courses have to be realized within the living lab, and the student is assessed by the lecturers of these courses. Students can participate two to five days a week, depending on the number of study credits they wish to attain.*

## 4.2 OUTCOMES

### (KNOWLEDGE) PRODUCTS

*This living lab yields advice for clients on different kinds of innovations in the fields of environment, agriculture, energy, and technology.*
*Other products of the living lab include concepts, models and tools for others to use when developing a living lab.*

### DEVELOPMENT

*All participants work on their personal professional development. For students as well as for lecturers and business participants the main learning outcomes are described as job requirements for an 'innovation professional'. These requirements give direction to each participant's own learning outcomes at his or her own level. The job requirements are: innovation, networking, interdisciplinary collaboration and learning, communication, professional effectiveness, personal development, and developing one's own field of expertise.*
*Team development is accomplished by collegial and peer-to-peer coaching and by collaborating on assignments (students) and on the design, implementation and evaluation of the living lab (faculty).*
*The organization of the living lab is being developed in the direction of a 'learning organization'.*[7]

### SUSTAINABLE IMPACT

*Some projects build on former projects, and links between projects are established.*

## 4.3 PROCESSES

The core theory used is the Illeris model for learning. Other important concepts are the 4C/ID model, models for coaching, and 'assessment for learning'. Coaching is the central form of facilitating learning, and it is complemented by workshops, meetings, excursions, etc. Educational activities are provided just-in-time, and they are tailor-made as much as possible.

7 Zie bijvoorbeeld Senge P.M. (2006). The fifth discipline. The art and practice of the learning organization.

## 4.4 DESIGN PRINCIPLES

For each design principle its *features* are described as they were manifested in the living lab 'Value in the Valley'.
For each feature, its effect and a condition for its manifestation are presented, as far as reported by participants of the living lab. The students' comments are labelled with (S), and comments by the faculty, which consisted of lecturers, educational consultants and business participants, are labelled with (F). The features are presented in random order.

### PRINCIPLE 1: FOSTERING AUTHENTICITY

Working/learning environment (context, tasks, activities, roles, and communication) reflects working practice, a professional working culture and organization.

*Examples of features:*

***FOSTERING AUTHENTICITY***

| Features | Effects | Conditions |
|---|---|---|
| **Authentic assignment** | Challenging, motivating (S) | Actively interested clients |
| **Professional culture** | Professional behaviour (S) | Respecting and living up to rules and values *(should be improved)* |
| **Being seen as a company** | Easy access to external experts (S) and (potential) clients (F) | - |
| **Senior participants from education and business** | Feedback from both enhances quality of work by students (F) | Balanced participation from education and business |
| **Location in business environment** | Professional behaviour, appreciation (S); taken seriously by external relations (F) | Finances for the rent |
| **Seniors and juniors as colleagues** | Taking each other more seriously (S,F) | - |
| **Integrated school/work culture** | Feels like a company (S,F); feels like school (S,F) – *(no consensus)* | - |

## PRINCIPLE 2. INTER-LINKING OF WORKING AND LEARNING

Participants learn by performing real life tasks that are supported by educational interventions. These interventions are attuned to the task and to the individual learner, and they inter-link working and learning.

*Examples of features:*

***INTER-LINKING OF WORKING AND LEARNING***

| Features | Effects | Conditions |
|---|---|---|
| **New ways of learning** | Learning by doing and discussing (S); learning by collaboration (F) | - |
| **Learning by example** | Learning by watching others work (S,F) | Working in the same room |
| **Balance structure - letting go** | Too much structure (S,F); not enough structure (S,F). *(no consensus)* | - |
| **Using a method for working in projects** | Efficient learning by students (F) | Focus on problem first; reflect on milestones |
| **Using external expertise** | Verification of information; generating new ideas, inspiration (S) | Coaching and stimulating students "to go outside" |
| **Balanced focus of learning** | Right balance between focus on task, process, person and knowledge (F). *(no consensus about the right balance)* | - |
| **Balance working/learning activities** | Learning activities support working activities (should not disrupt each other) (S,F) | Supportive information is timely, to-the-point, tailored to participants |
| **Adaptive interventions** | Interventions when needed, not too ad hoc (S,F) | Underlying educational concepts and instruments |
| **Increasingly complex tasks** | First learning "how it works here" during easier tasks works well (S) | Efficiency; saving enough time for the most complex assignment *(F not sure how to accomplish this)* |
| **Guiding students' learning** | Very helpful (S) | Different faculty roles: coach, client's representative, expert |

## PRINCIPLE 3. UTILIZING DIVERSITY

Diversity is built-in, valued and utilized both at team and organizational levels and in internal and external networks.

*Examples of features:*

*UTILIZING DIVERSITY*

| Features | Effects | Conditions |
|---|---|---|
| **Working with people from different disciplines and education levels** | Learned a lot from other disciplines; for different education levels collaboration (S) and coaching (F) was sometimes difficult. | Good coaches |
| **Learning from each other** | Motivation to learn; getting new ideas (S) | - |
| **Using different points of view** | More people = more ideas = better results (S); better learning (F) | Balanced diversity in characteristics of team members |
| **Collaboration** | Combining knowledge requires collaboration; dividing tasks is not enough (S); collaboration reinforces learning by combining knowledge (F) | - |
| **Feedback from different people** | Stimulates reflection and learning about oneself (S,F) | Feedback from people with different backgrounds and views |
| **Meeting new and interesting people** | Inspiration by meeting new colleagues from other fields (F) | - |
| **Using each other's strengths** | Everyone is challenged to contribute and feels respected and valued for their input (S,F) | Everyone's input is needed for the task |
| **Explaining to others** | Understanding of task improves, becoming more helpful and more assertive (S) | Everyone's input is needed for the task |

## PRINCIPLE 4. FACILITATING REFLEXIVITY

Participants learn by reflection on tasks and experiences as a person, team and organization. Critical events in the working activities are the starting point for reflection and learning.

*Examples of features:*

*FACILITATING REFLEXIVITY*

| Features | Effects | Conditions |
|---|---|---|
| Assessment *for* learning | Thinking about what is learned (S) | Setting goals and reflecting on learning with coach |
| Focus on person | Understanding behaviour of oneself and others; consciously making more future-oriented choices; growing as a whole person (S) | Facilitating individual personal and professional development |
| Reflection *on* action | Taking responsibility for learning; wanting to improve and live up to expectations (S) | Tools for and dialogue about feedback |
| Reflection *in* action | Continually thinking about what we do and why (S) | Feedback from practice; immediate adjustment and improvement |
| Connectivity school programme | Learning outcomes compatible with study programme (S) | Clear communication with school; relevant assignments from clients |

## PRINCIPLE 5. CREATING A LEARNING COMMUNITY

Community: every member should experience a sense of belonging to the community.
Learner equity: every member of the community is a learner, each at their own level.

*Examples of features:*

### *CREATING A LEARNING COMMUNITY*

| Features | Effects | Conditions |
|---|---|---|
| **Learning from and with each other** | Useful tips and ideas (S,F) | Activities for information exchange between teams; working in Communities of Practice (S,F) |
| **Ownership** | Taking responsibility; showing initiative (S) | Making students responsible; clear expectations; professional environment; coaching (F) |
| **Sense of community** | Enjoying working and having fun at the same time; being willing to help each other; feeling at home (S); being yourself (F) | Culture of respect; openness; genuine interest in each other; equality; knowing each other personally |
| **Learner equity** | Improved coaching of juniors and learning by faculty (F) | Congruent learning activities by faculty and students, each at their own level *(could be improved)* |

## PRINCIPLE 6. ENABLING ORGANIZATION

The organizational structure and culture supports the working process, knowledge creation and sharing at every level (individual, team, organization, society).

*Examples of features:*

### *ENABLING ORGANIZATION*

| Features | Effects | Conditions |
|---|---|---|
| **Facilitating working *and* learning** | Being creative as well as organized (F) | Small community; "face-to-face time", flexible organization structure |
| **Sharing physical space** | Easy contact students and faculty; knowing who has which expertise; learning by example (S, F) | Students and faculty working in the same room |
| **Connectivity stakeholders** | Participating institutions involved and committed (also financially) (F) | Shared vision and concepts; communication tailored to different stakeholders *(needs improvement)* |
| **Learning organization** | On-going development and innovation (F) | Research, reflection, monitoring and evaluation (avoid routine, specialization, and differentiation of tasks) |
| **Explicit culture** | Coaching on cultural aspects (F) | Making culture explicit when introducing new participants. |

## PRINCIPLE 7: ENABLING ECOLOGY

The living lab is attuned to its surroundings, which includes partner organizations and other stakeholders.

*Examples of features:*

***ENABLING ECOLOGY***

| Features | Effects | Conditions |
|---|---|---|
| ***Coordinating learning outcomes of students with lecturers study programmes*** | *Students can account for their learning results and get study credits for their work at the living lab.* | *Good arrangements between living lab and participating study programmes* |
| ***Recruiting students in cooperation with study programmes*** | *The living lab is an accepted (elective) part of study programmes.* | *Lecturers of participating study programmes and living lab are well acquainted with each other.* |
| ***Acquisition of suitable external assignments*** | *Multidisciplinary teams of students can be matched with assignments.* | *A network of clients.* |
| ***....*** | | |

# APPENDIX:
# FORMAT FOR DESCRIBING A LIVING LAB
## BASED ON THE DEVELOPMENT MODEL LIVING LABS

### A. STARTING POINTS [NAME LIVING LAB]
Motive and urgency; aims and ambition

Context, prerequisites, resources

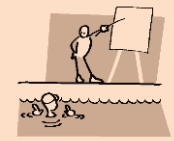
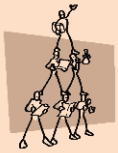
### B. OUTCOMES
Outcomes – processes

Outcomes – development

Outcomes – sustainable impact

### C. PROCESSES

### D. DESIGN PRINCIPLES AND FEATURES OF THE LIVING LAB
Describe clearly how the living lab features embody the design principles in practice. A feature of the living lab can be inspired by several different design principles. For instance, the feature ‘all participants share one working room’ can be derived from principle 6, Enabling organization, but it will also enhance a feeling of ‘community’ (principle 2).

| | NAAM IWP: | DATUM: |
|---|---|---|
| | **DESIGN PRINCIPLES** | **FEATURES OF THE LIVING LAB AND ITS PARTICIPANTS** |
|  | **1. Fostering authenticity**<br>Working/learning environment (context, tasks, activities, roles, and communication) reflects working practice, a professional working culture and organization. | |
|  | **2. Creating a learning community**<br>Community: every member should experience a sense of belonging to the community.<br>Learner equity: every member of the community is a learner, each at their own level. | |
|  | **3. Utilizing diversity**<br>Diversity is built-in, valued and utilized both at team and organizational levels and in internal and external networks. | |
|  | **4. Inter-linking of working and learning**<br>Participants learn by performing real life tasks that are supported by educational interventions. These interventions are attuned to the task and to the individual learner, and they inter-link working and learning. | |
|  | **5. Facilitating reflexivity**<br>Participants learn by reflection on tasks and experiences as a person, team and organization.<br>Critical events in the working activities are the starting point for reflection and learning. | |
|  | **6. Enabling organization**<br>The organizational structure and culture supports the working process, knowledge creation and sharing at every level (individual, team, organization, society). | |
|  | **7. Enabling ecology**<br>The living lab is attuned to its surroundings, which includes partner organizations and other stakeholders. | |

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