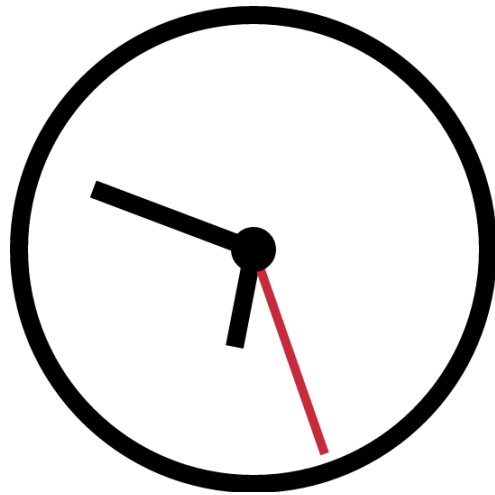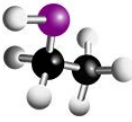# Building a Research Program for Craft Breweries

**Starting a research project, framing the issue,
and finding relevant literature to support quality/brewing operations**

Versuchs- und Lehranstalt für Brauerei in Berlin (VLB) e.V.

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Dr.- Ing. Nils Rettberg

Research

- "improvements"
- cost reduction / efficiency
- new techniques
- innovative products

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Designing and planning research

The worst you can do is begin working without a design!

Every second spend on

- **framing the issue precisely**
- **finding relevant literature**
- **developing a strategy how to solve a problem**

will pay out twice.

Although:
A good plan **not** necessarily works and remains unchanged throughout a project. Still, the chance of a good plan leading you far is quite good.

Designing and planning research

Before discussing research with supervisor/team/external partners take some time to focus!

Set up a brief proposal providing details of your intended studies:

1. Background, topic, and problem to be investigated/solved

2. Briefly summarize the current knowledge (process data, literature,…)

3. Provide potential strategies to solve the problem

   - Strategy A (risks and countermeasures - advantages, disadvantages)

   - Strategy B (…)

   - Strategy C (…)

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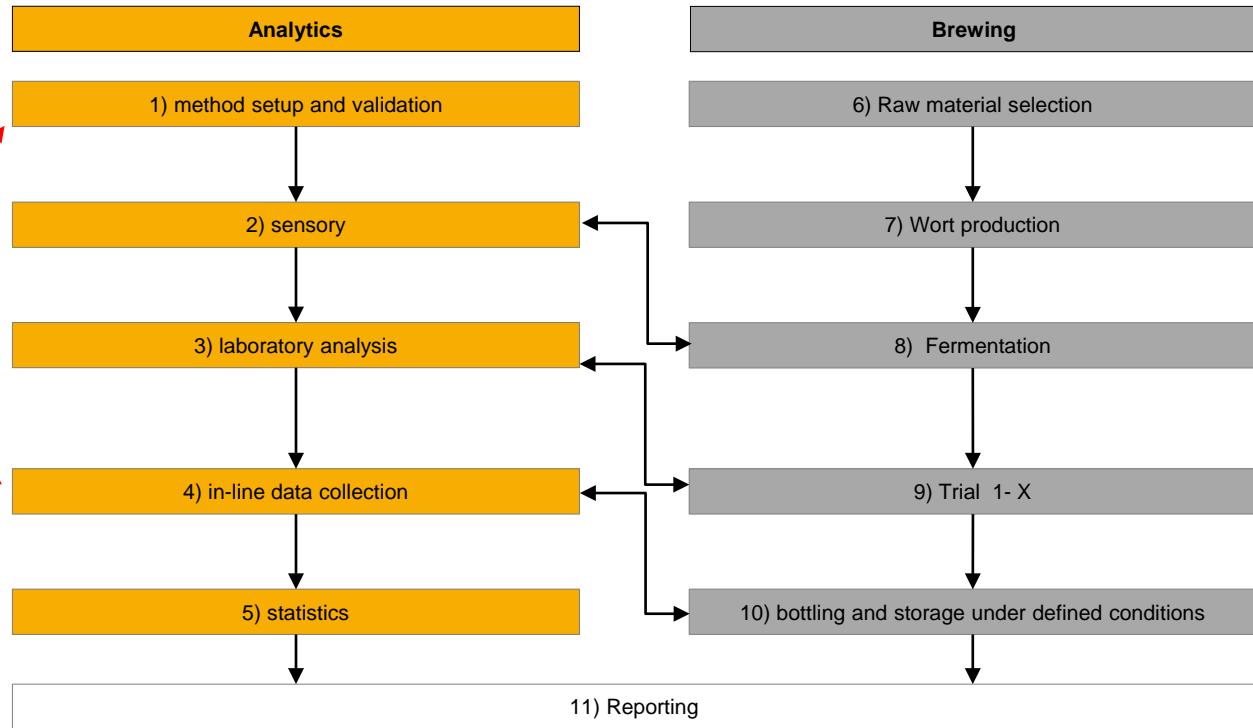BERLIN

Designing and planning research

After that, the scale and depth of research must be outlined.

What are the resources you have / are available to you?
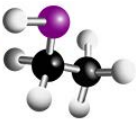
- time

- existing knowledge (in the company)

- manpower / man hours

- external support

- materials, samples, funding

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Definition of workpieces

Analytics
1) method setup and validation
2) sensory
3) laboratory analysis
4) in-line data collection
5) statistics

Brewing
6) Raw material selection
7) Wort production
8) Fermentation
9) Trial 1- X
10) bottling and storage under defined conditions

11) Reporting

break the project down in defined **workpieces**

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detailed project schedule

timeline →

workpieces →

Arbeitspaket	Monate	1 Jan 18	2 Feb 18	3 Mrz 18	4 Apr 18	5 Mai 18	6 Jun 18	7 Jul 18	8 Aug 18	9 Sep 18	10 Okt 18	11 Nov 18	12 Dez 18	13 Jan 19	14 Feb 19	15 Mrz 19	16 Apr 19	17 Mai 19	18 Jun 19	19 Jul 19	20 Aug 19	21 Sep 19	22 Okt 19	23 Nov 19	24 Dez 19	Monate
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Mitarbeiter 2 - n.n. 2		0,50	0,50	0,75	0,50	0,50	0,50	0,50	0,50	0,75	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,50	0,75	0,50	0,50	0,50	0,50	0,50	12,75
Mitarbeiter 3 - n.n. 3		0,75	0,75	0,75	0,75	0,50	0,75	0,75	0,50	0,75	0,75	0,75	0,75	0,75	0,50	0,75	0,75	0,50	0,75	0,75	0,75	0,75	0,75	0,50		16,00
Mitarbeiter 4 - n.n. 4		0,75	0,75	0,75	0,75	0,50	0,75	0,75	0,50	0,75	0,75	0,75	0,75	0,75	0,50	0,75	0,75	0,50	0,75	0,75	0,75	0,75	0,75	0,50		16,00
Summe Personal	50,75	2,25	2,25	2,50	2,25	1,75	2,25	2,25	1,75	2,50	2,25	2,25	2,25	2,25	1,75	2,25	2,25	1,75	2,25	2,50	2,25	2,25	2,25	1,75	0,75	50,75

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Finding relevant literature

a) proper literature search will prevent you from duplicating work!

b) synthesizing published information provides helpful strategies and gives justification/background for your own study!

c) relevant literature gives valuable insights in terms of methodology

d) helps to find weaknesses in existing research, so you will be able to fill "the right gaps"

e) you will become used to terms and expressions being used in the respective field of science and are able to find suitable/meaningful keywords

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1) Define your keywords

- targeted keywords are very important
- break the topic you are researching into its main concepts, then define keywords

Defining keywords – checklist

✓ Is there any alternative vocabulary used in discussion of my topic?

✓ Are there American and British variants of spelling? (flavor-flavour)

✓ Are common abbreviations, acronyms or formulae used? (GC, SPME,…)

✓ Do certain general terms might include your topic?

✓ Are you able to define specific cases or examples?

✓ Are there categories you would like to exclude?

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2) Start your search

Category	general database search*	publisher databases and journal websites
Examples	• Scopus • Web of Knowledge • Google Scholar • …	• Wiley • Elsevier • Oxford Journals • JASBC • IBD • BrewingScience • …
Use to…	• Getting the discovery process started • find popular papers	• Browse Journals in your field of research • Look for research in niche topics

* limiting your search to only one database may cause you to overlook relevant articles

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3) Follow the citations

once you have identified one/some relevant articles there are two easy ways to find more interesting studies…

◄◄ backward searching

check the reference list(s), reference studies are likely to be quite relevant

for you as well!

►► forward searching

look at the papers citing the article(s) since they were published. By this you

may find newer studies that have built upon the work!

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4) record your searches

- make sure you record your searches

- the are may ways (using a software might be one)

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Update your initial proposal after an extensive literature survey

1. Background, topic and problem to be investigated

2. Knowledge **(UPDATED !)**

3. Provide potential strategies to solve the problem

    • Strategy A (risks and countermeasures - advantages, disadvantages)

    • Strategy B (…)

    • Strategy C (…)

Questions?

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