

G-L-3

# Assignment Guidelines

The Modelling Team  
Faculty of Industrial Design Engineering  
Delft University of Technology

# Table of Contents

## 01. Assignments

- P-A-1
- P-A-2
- H-A-1
- H-A-2

## 02. P-A-1

- P-A-1-T: Cooler is better
- P-A-1-F: A more effective pressure sprayer

## 03. The experiments

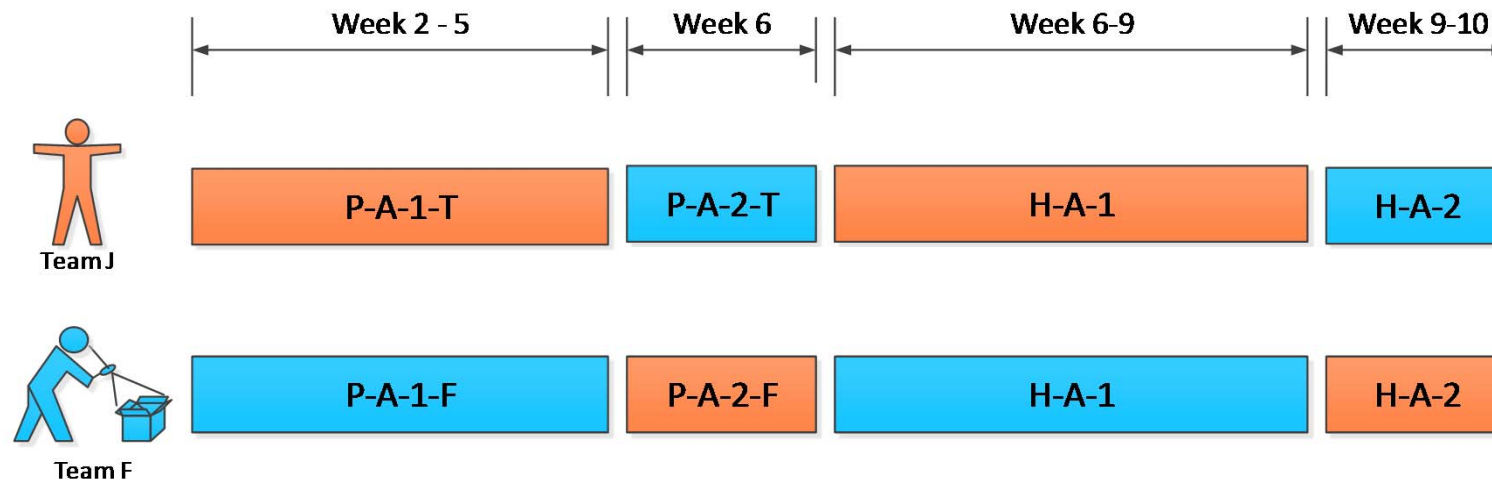
- Place
- Schedule
- Equipment

## 04. Planning & Evaluation

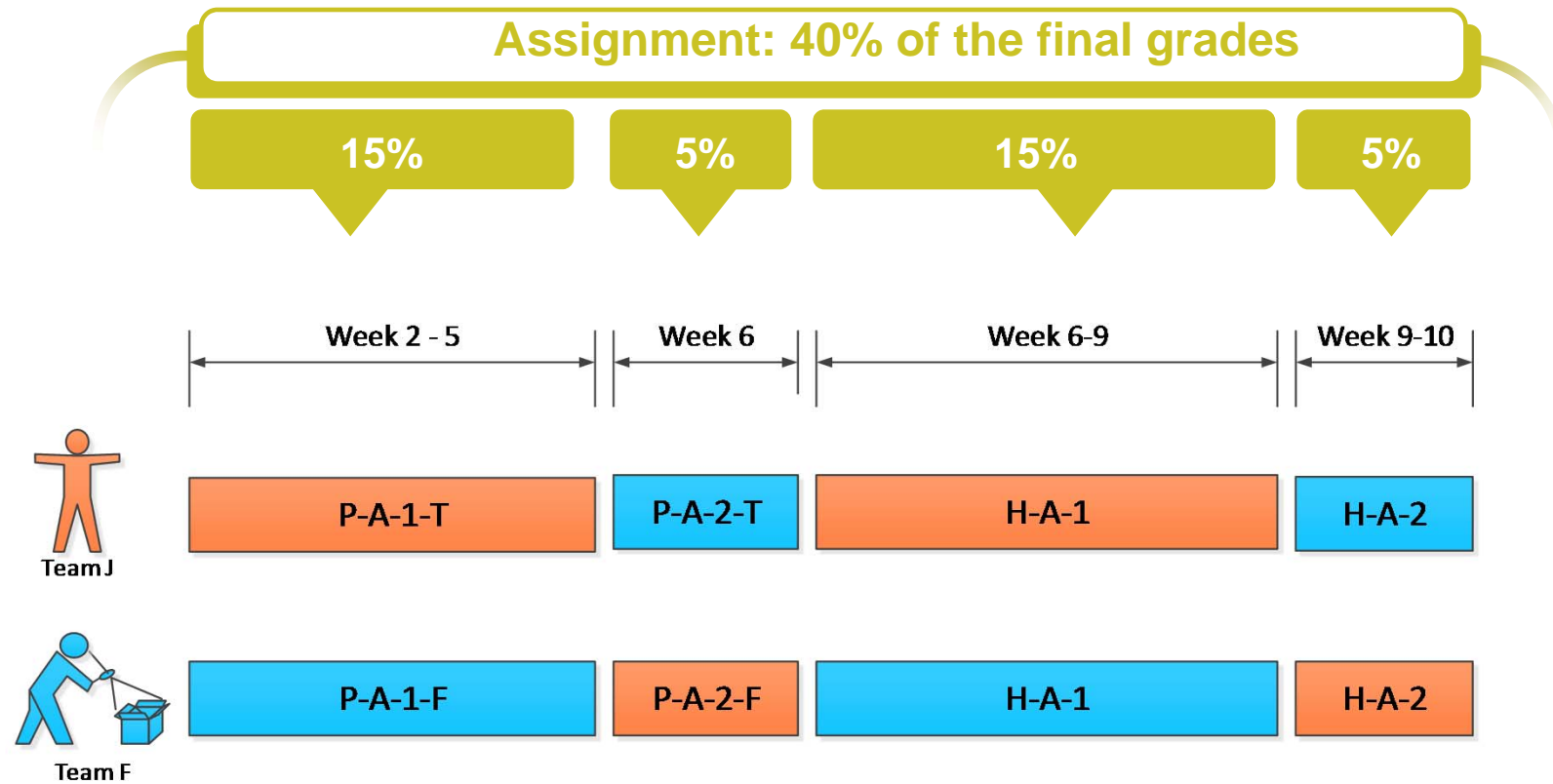
- Suggested steps
- Schedule
- Presentation
- Reports



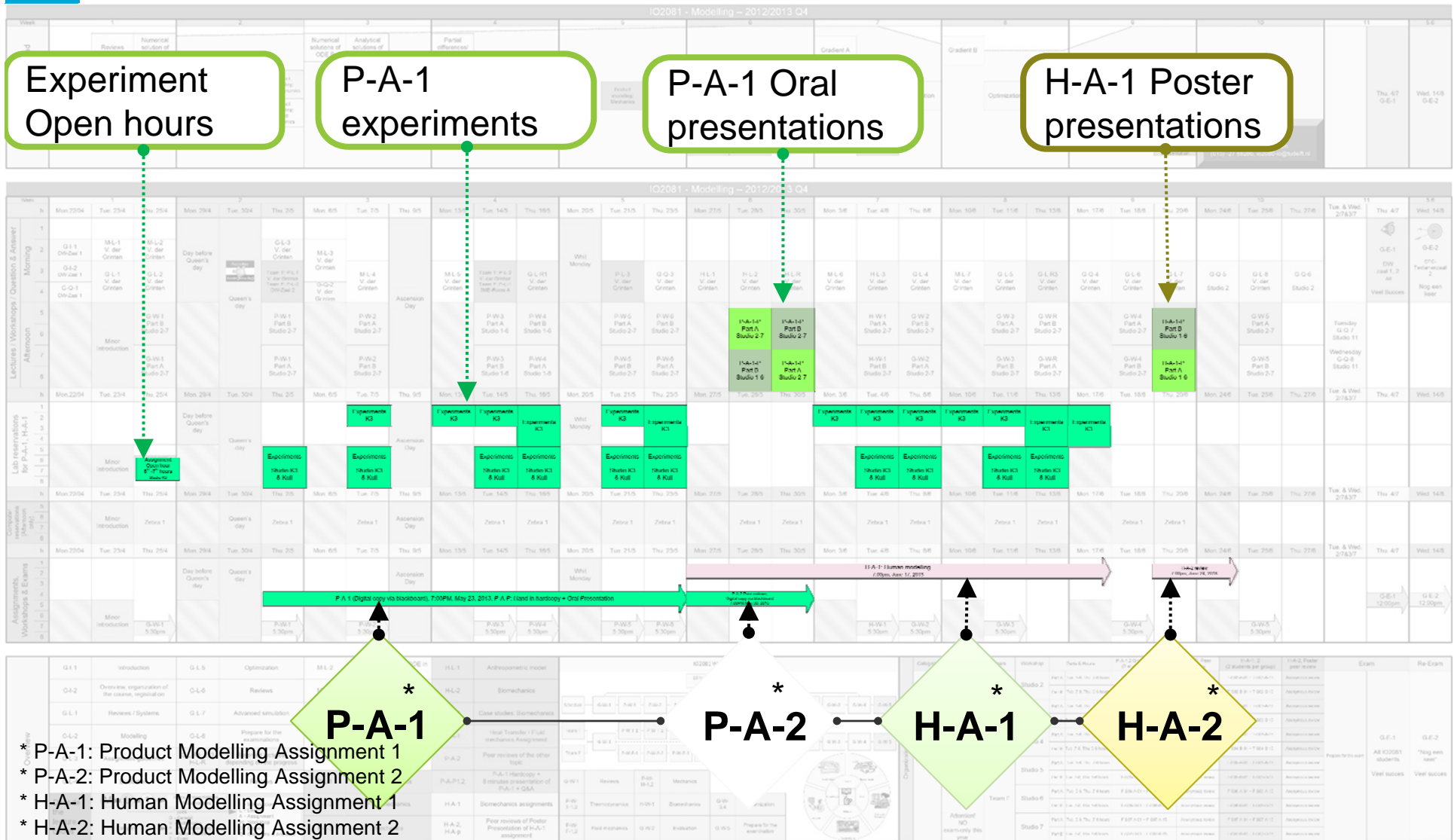
# Assignments of IO2081 Modelling



# Assignments of IO2081 Modelling



# Four assignments



# P-A-1

Hardcopy,  
Presentation

Experiments

Open  
Hours

Assignment  
Open hour  
6<sup>th</sup>-7<sup>th</sup> hours  
Studio K1

Experiments  
Studio K3  
& Kuil

Experiments  
K3

Experiments  
Studio K3  
& Kuil

Experiments  
K3

Experiments  
Studio K3  
& Kuil

Experiments  
K3

Experiments  
Studio K3  
& Kuil

P-A-1-P Part A Studio 2-7	P-A-1-P Part B Studio 2-7
P-A-1-P Part B Studio 1 6	P-A-1-P Part A Studio 2 7

Deadline,  
7:00pm,  
May 23

P-A-1 (Digital copy via blackboard), 7:00PM, May 23, 2013 P-A-P: Hand in hardcopy + Oral Presentation

# P-A-1

Team T



IO2081: Team T P-A-1 Assignment

Cooler is better

DE-10-TUDELFT  
2012-2013  
Authored by: The Modelling Team  
Fiction case study, for education only

Team F



IO2081: Team F P-A-1 Assignment

A more effective pressure sprayer

DE-10-TUDELFT  
2012-2013  
Authored by: The Modelling Team  
Fiction case study, for education only  
Gamma© is a trademark of Gamma B.V.



# Do one assignment only, then review another

Lecture sequences are different for different themes



Then review another Team: P-A-2

Team T

Start from Thermodynamics

Team T: P-A-1

How long will the juice be cooled?



Team F

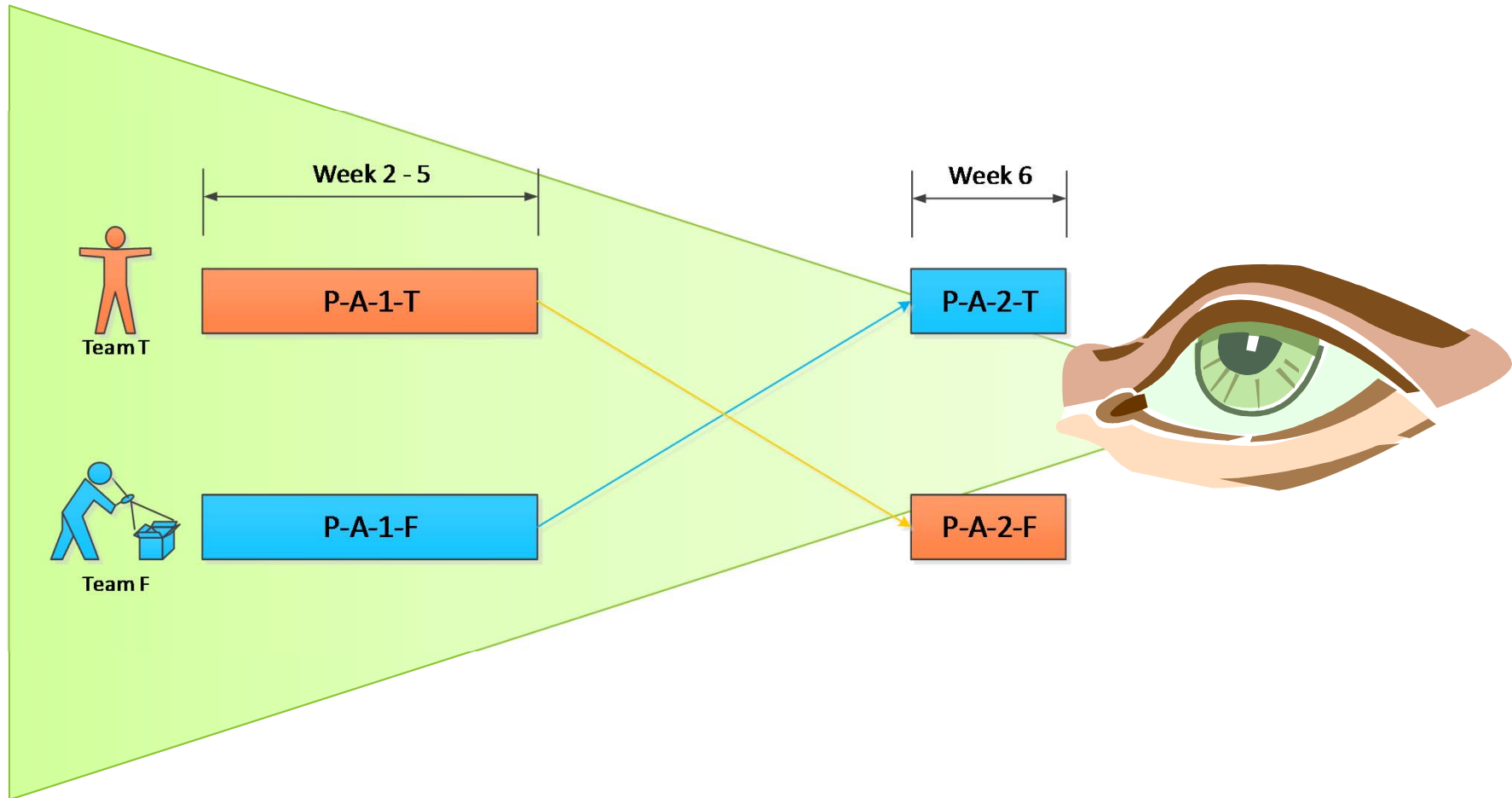
Start from Fluid mechanics

Team F: P-A-1

How long will the jet work?



# Keep an eye on your neighbors



# Assignment logistic center

Assignment logistic center  
**studio**



Courtesy of [wallpapers-achtergronden.blogspot.nl](http://wallpapers-achtergronden.blogspot.nl)



P-A-1-T: Cooler is better

# P-A-1-T: Cooler is better

## • Cooler is better

Curver® wants to put a children's beaker on the market that keeps a portion of juice nicely cool **from home until morning break**. They have a **0.5 L cup** that serves as **a starting point** and they ask you to test this cup for its insulating qualities and give advice on the design of the beaker. The 0.5 L cup is obviously too big. They want to **know the (dis)advantages of each of your improvements**.



*Fiction case study  
Courtesy of [www.curver.com](http://www.curver.com)*

# P-A-1-T: Cooler is better

## About the product

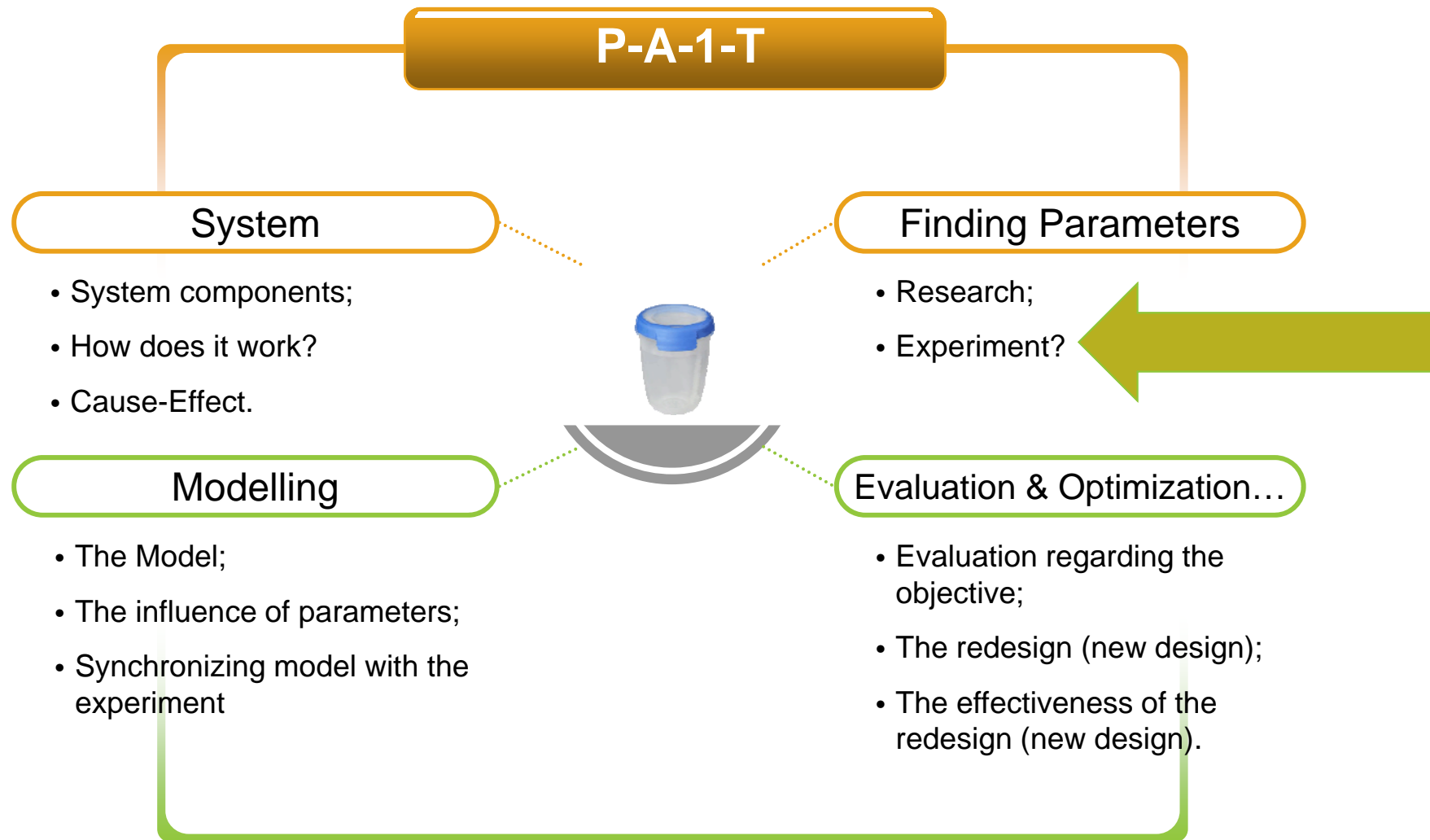
Grand Chef is a line of Premium food keepers, a “must” of long – term food preservation. 21 sizes (rectangular, square, round), available in 3 colors (lids).

- 30 years guarantee
- 100% hermetic (airtight closing)
- temperature resistant : from -40°C to +100°C
- dishwasher safe
- great variety of shapes for all usages including soup, salad, baby leftovers....

*Fiction case study*

*Courtesy of [www.curver.com](http://www.curver.com)*

# P-A-1-T: In General



# P-A-1-T: Measure temperature

How many thermal couples do I need?



Temperature



Time

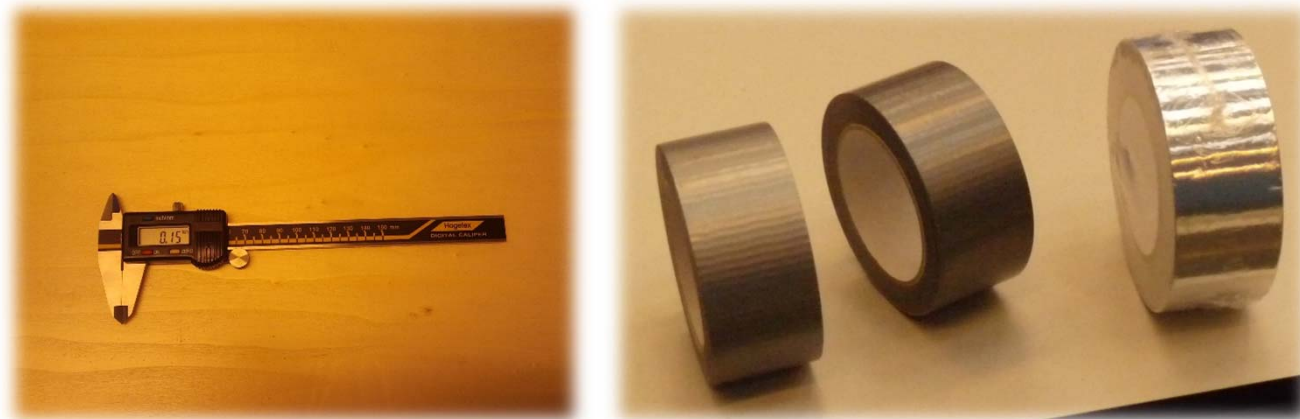


Location


The process may last half-hour, record data by your pen & paper



# P-A-1-T: Do we need them?



GRANTA | CES 2012  
EDUPACK



# P-A-1-F: A more effective pressure sprayer

## P-A-1-F: A better “drukspuit”

### • A better “drukspuit”

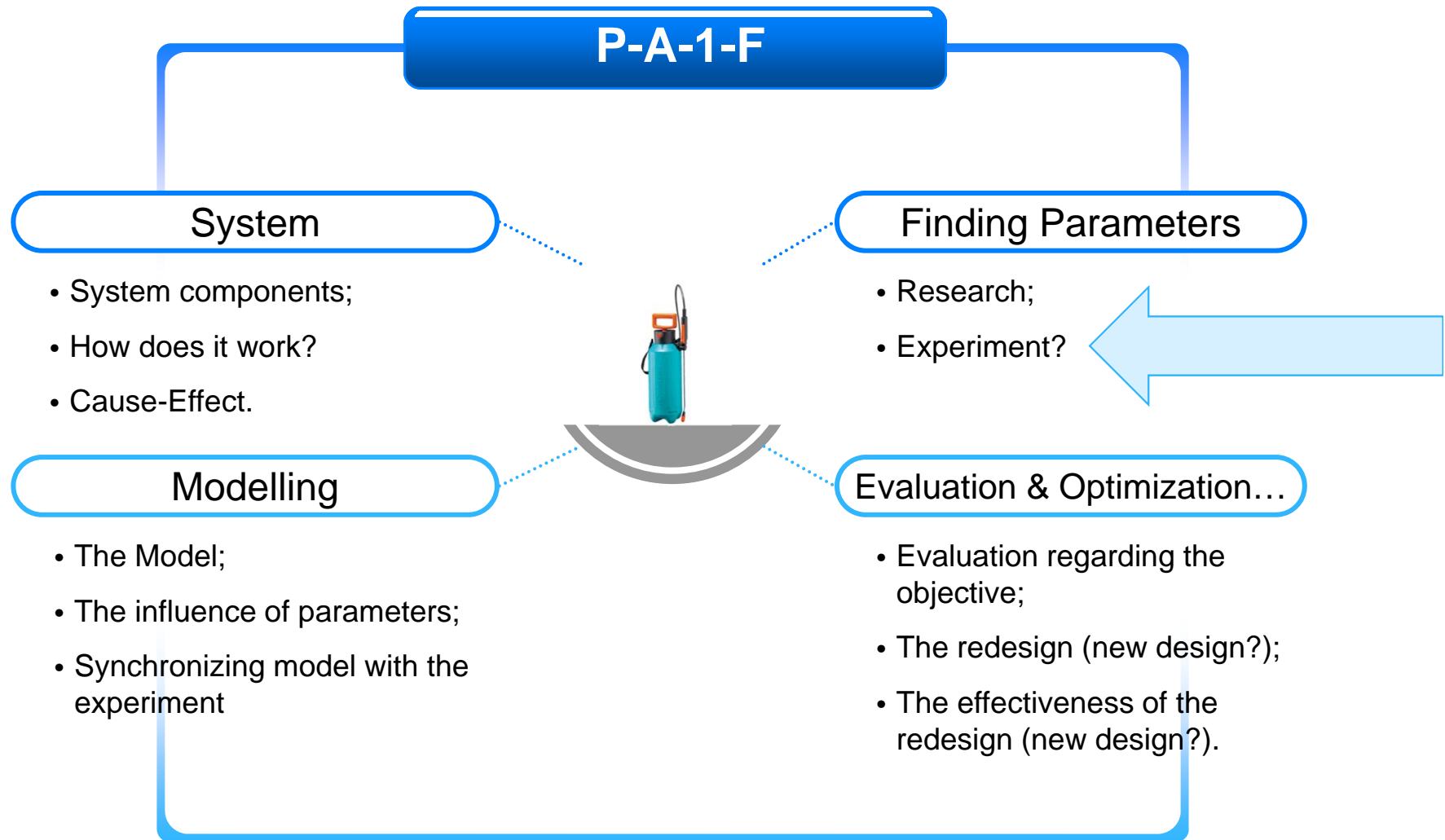
Gardena® GmbH, located in Ulm (Germany), is a manufacturer of gardening tools and a market leader in Europe. Gardena® needs to quantify their claim regarding the **performance** of their pressure sprayer (‘drukspuit’ in Dutch). They have asked you to help them do so and give advice on the design as well, especially on velocity of the flow and the ratio between water and air inside the barrel.

1. Release the **largest possible quantity of water** when the valve is completely open in one “full charge”;
2. Estimate **the speed of water** in the process.



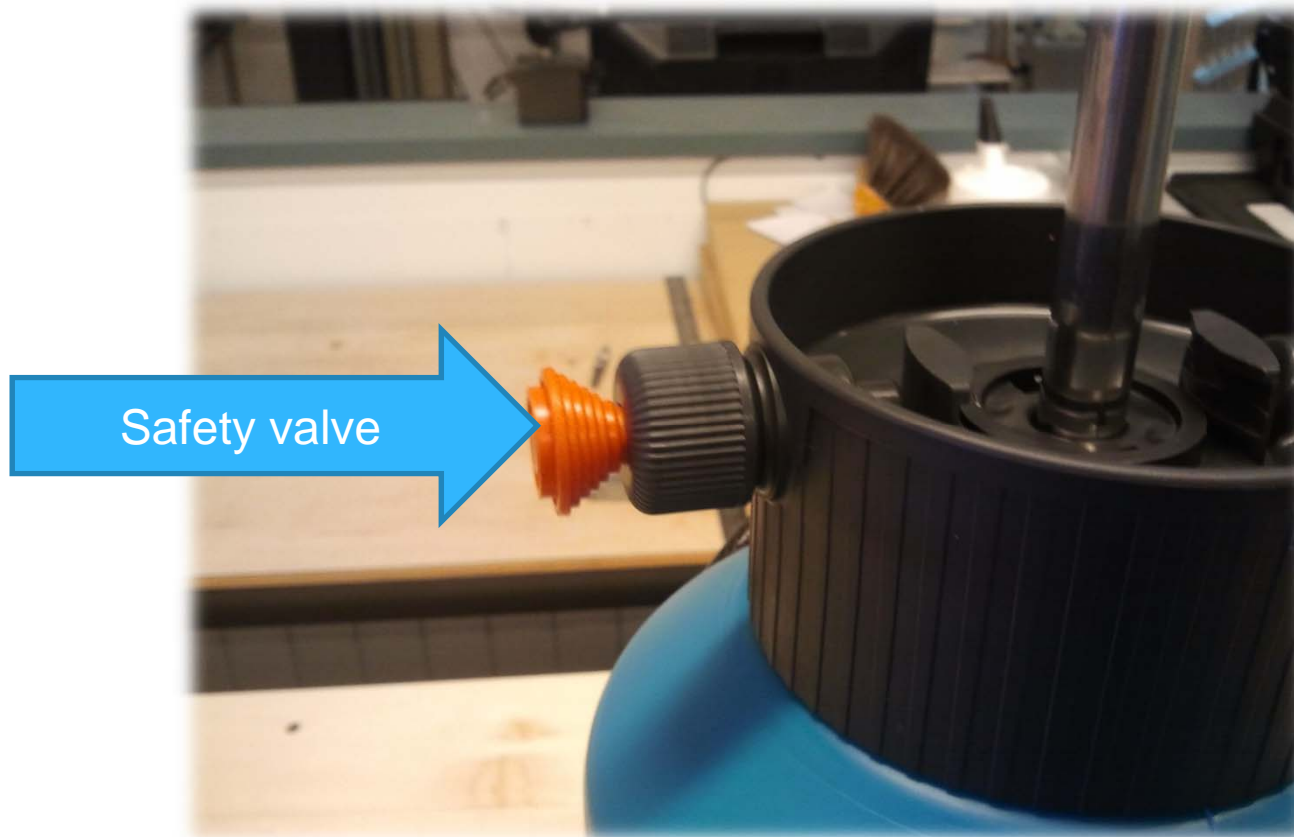
*Fiction case study  
Courtesy of [www.gardena.com](http://www.gardena.com)*

# P-A-1-F: In General





# P-A-1-F: Safety valve



# P-A-1-F: Calibration



Thank you, Mr. Herman Broekhuizen



When you read 0 from the manometer, what is the pressure now?

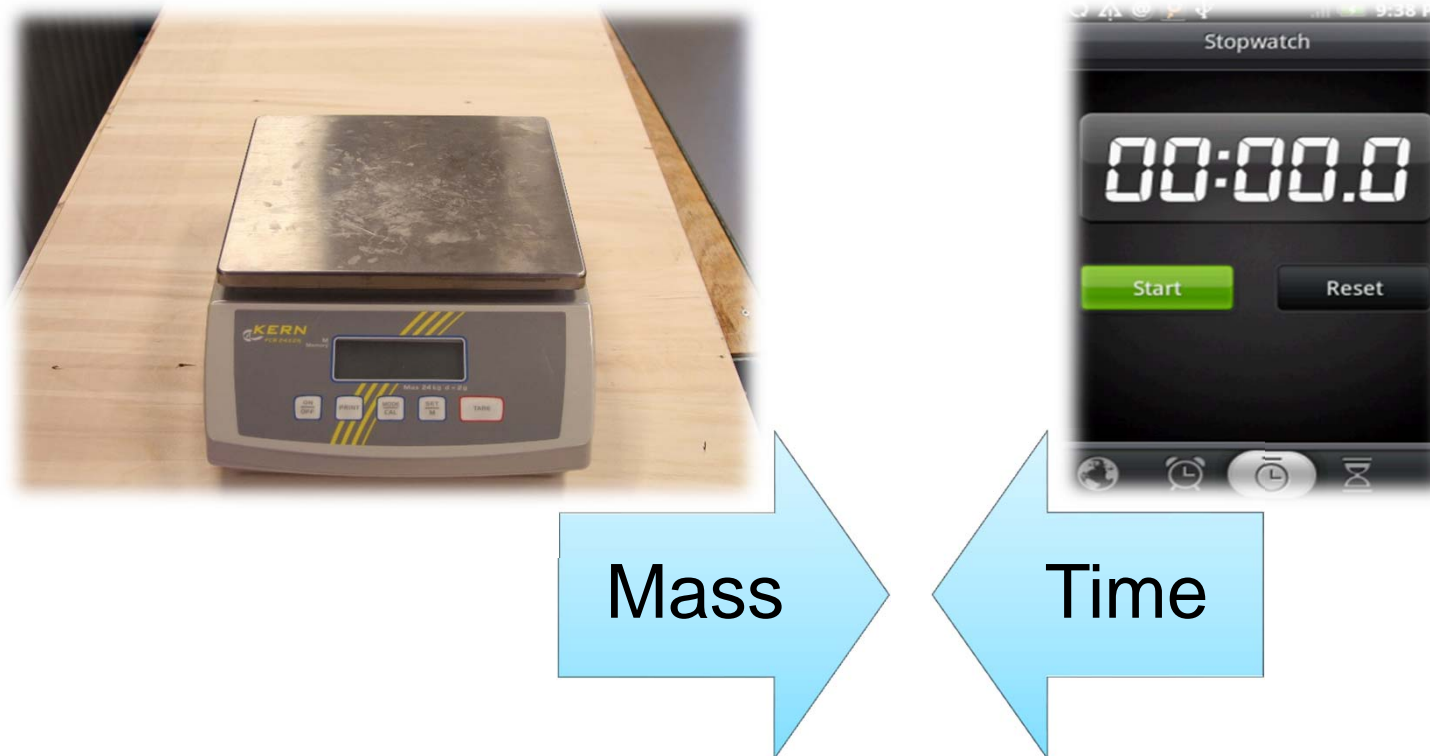
• Question

# P-A-1-F: Inside the product

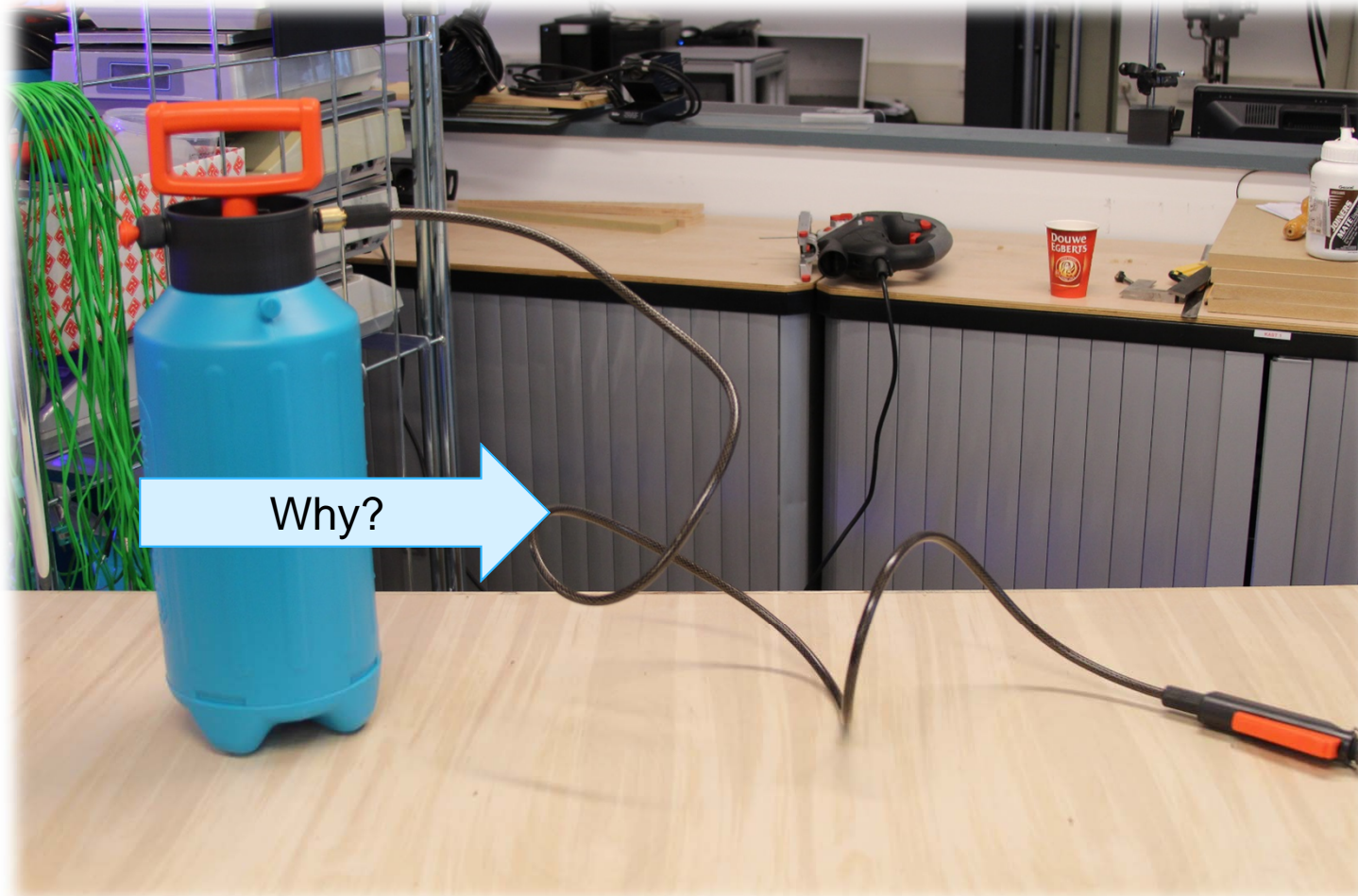




# P-A-1-F: Measure the flow rate



P-A-1-F: Keep the shapes of the tube  
as similar as possible in different experiments



# P-A-1-F: Keep dry, please

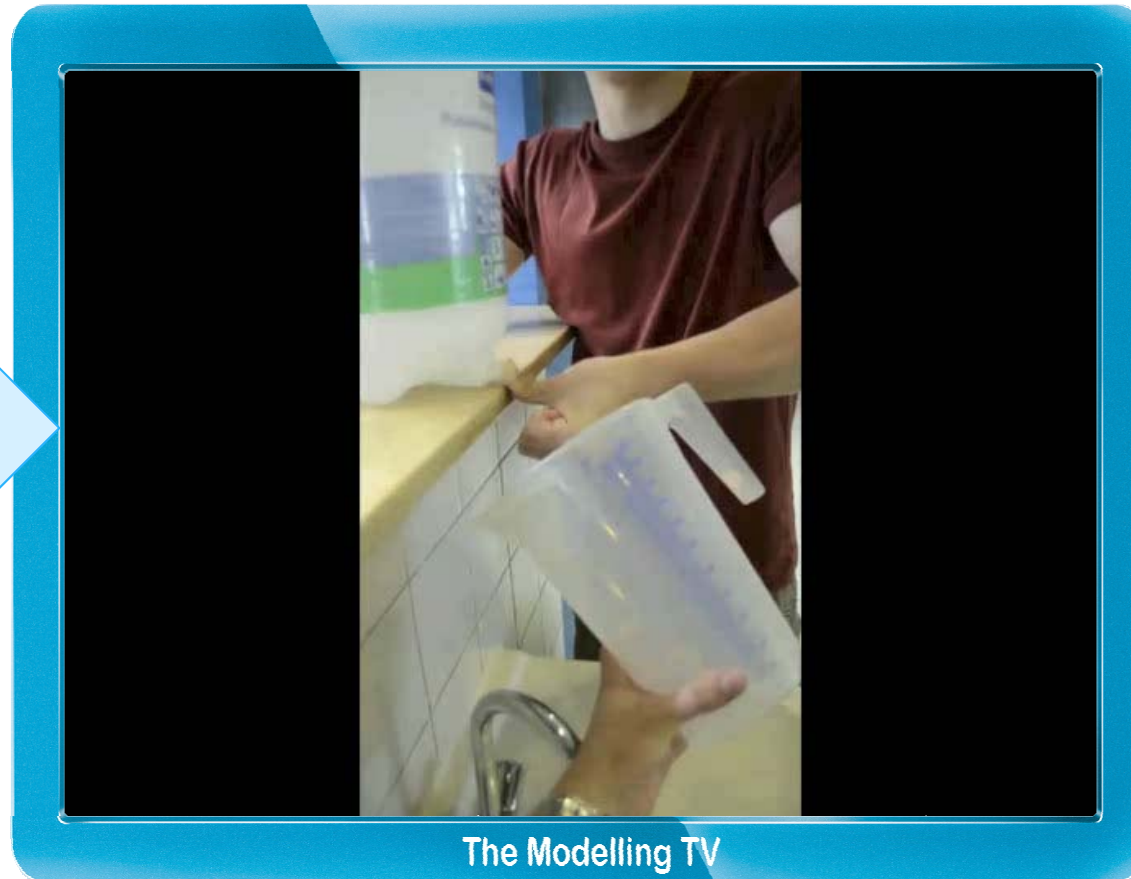


Keep dry, please



# P-A-1-F: Curiosity is fun

Why?



Video is provided by Matthijs van Leeuwen

-A-1 experiments

P-A-1 Experiments

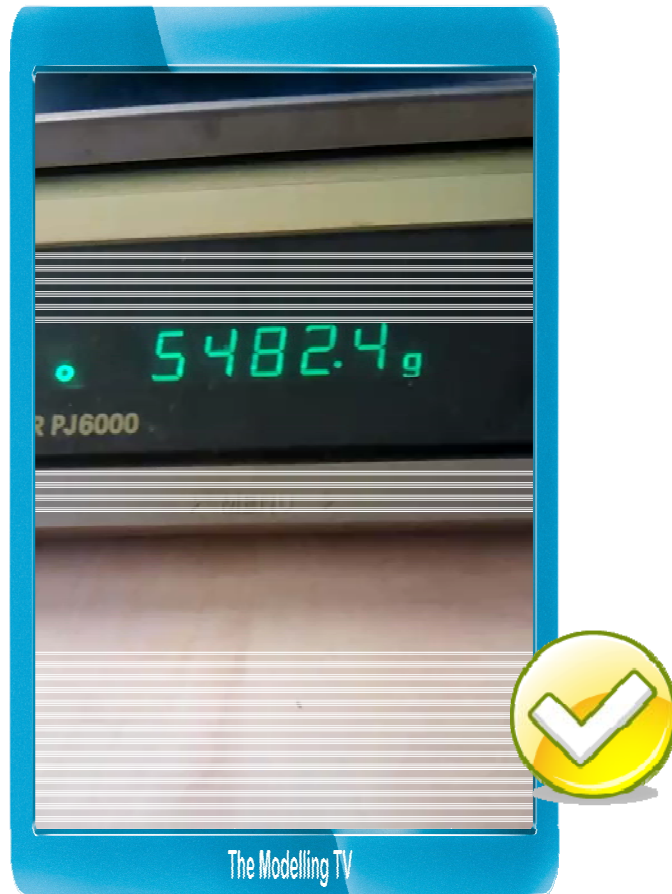
Who are we?



TA:

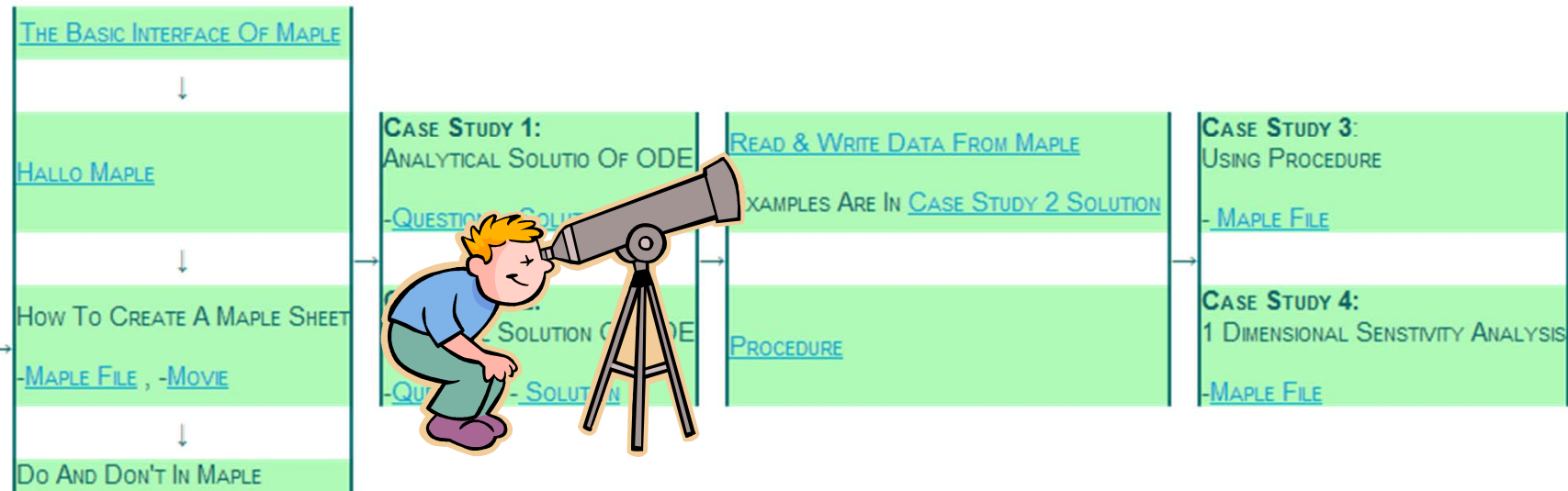
Mr. Jasper Henny  
Ms. Boyi Wang

What did they prepared?



# Maple: Data In & Out

[MATHEMATICAL SYMBOLS](#)





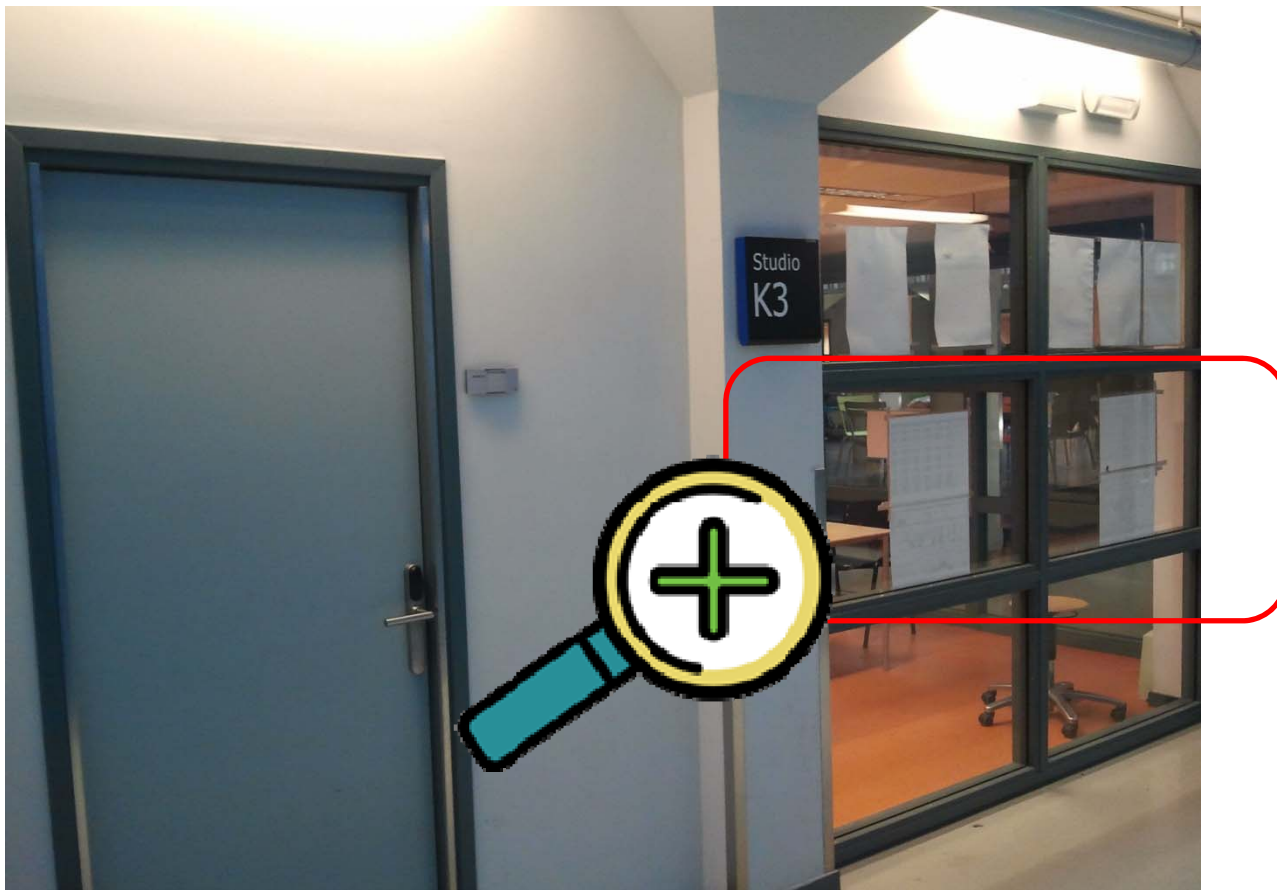
Think: Do you need all measuring devices?

Shall I trust all data out of the measurement devices

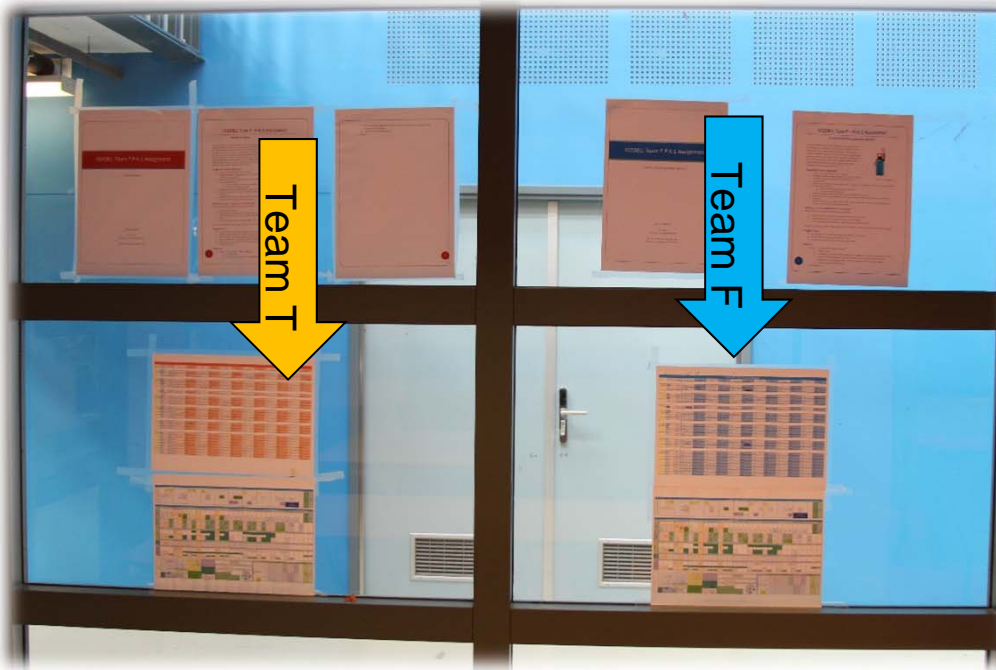
• **Question**



# P-A-1 experiment logistics point



# P-A-1 experiment logistics point



al there are **192** 2-hours and **96** 1-hour time spans for each Team (85 groups)

We got more than enough capacities!

you need extra experiments, talk with our lab staff for a possible place(s)

# How can I book an experiment?

Team T - The Cup								
Date	Hours	Duration	Set 1	Set 2	Set 3	Set 4	Set 5	
2-May	THU	5~6	2 hours	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -
		7~8	2 hours	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -
7-May	TUE	1~2	2 hours	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -
		5~6	2 hours	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -
		7~8	2 hours	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -
13-May	MON		2 hours	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -
14-May	TUE	1~2	2 hours	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -
		5~6	2 hours	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -
		7~8	2 hours	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -
16-May	THU	1~2	2 hours	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -

Write your group name here, for example, T-S02-B-02

Now:  
Group T-S02-B-02  
will do the first experiment in  
Tuesday, May 7  
from 5<sup>th</sup> to 6<sup>th</sup> hour  
using the 1<sup>st</sup> set of equipments

Hour

# 2 experiments

Team T - The Cup								
Date	Hours	Duration	Set 1	Set 2	Set 3	Set 4	Set 5	
2-May	THU	5~6	2 hours	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -
Experiment 1: Initial test				T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -
7-May	TUE	1~2	2 hours	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -
		5~6	2 hours	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -
		7~8	2 hours	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -
13-May	MO	1~2	2 hours	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -
14-May	TUE	1~2	2 hours	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -
		5~6	2 hours	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -
		7~8	2 hours	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -
16-May	THU	1~2	2 hours	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -	T-S0 - -

Always use the same set of equipment's in two experiments to avoid errors caused by small differences between products

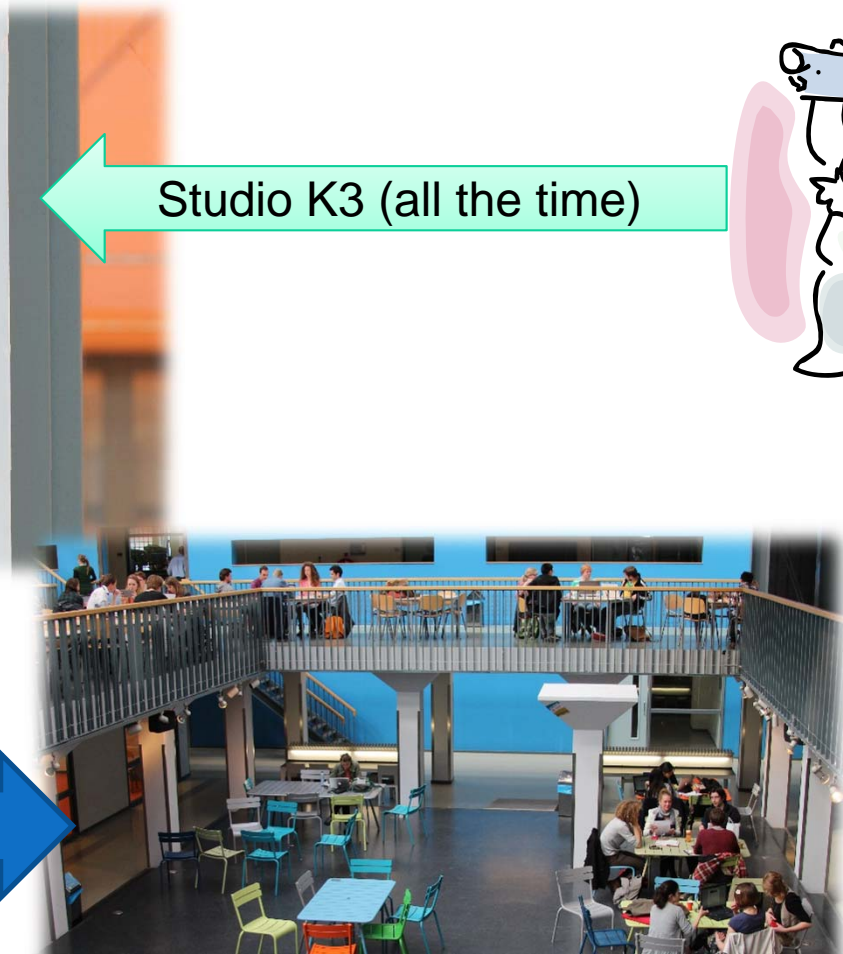
Do experiment @



Studio K3 (all the time)



e Kuil (Tue. & Thu. Afternoon)



Where can I find water?



The corridor in front of PMB

Hot & Cold Water



Keep IO dry and clean all the time

Ja



Nea

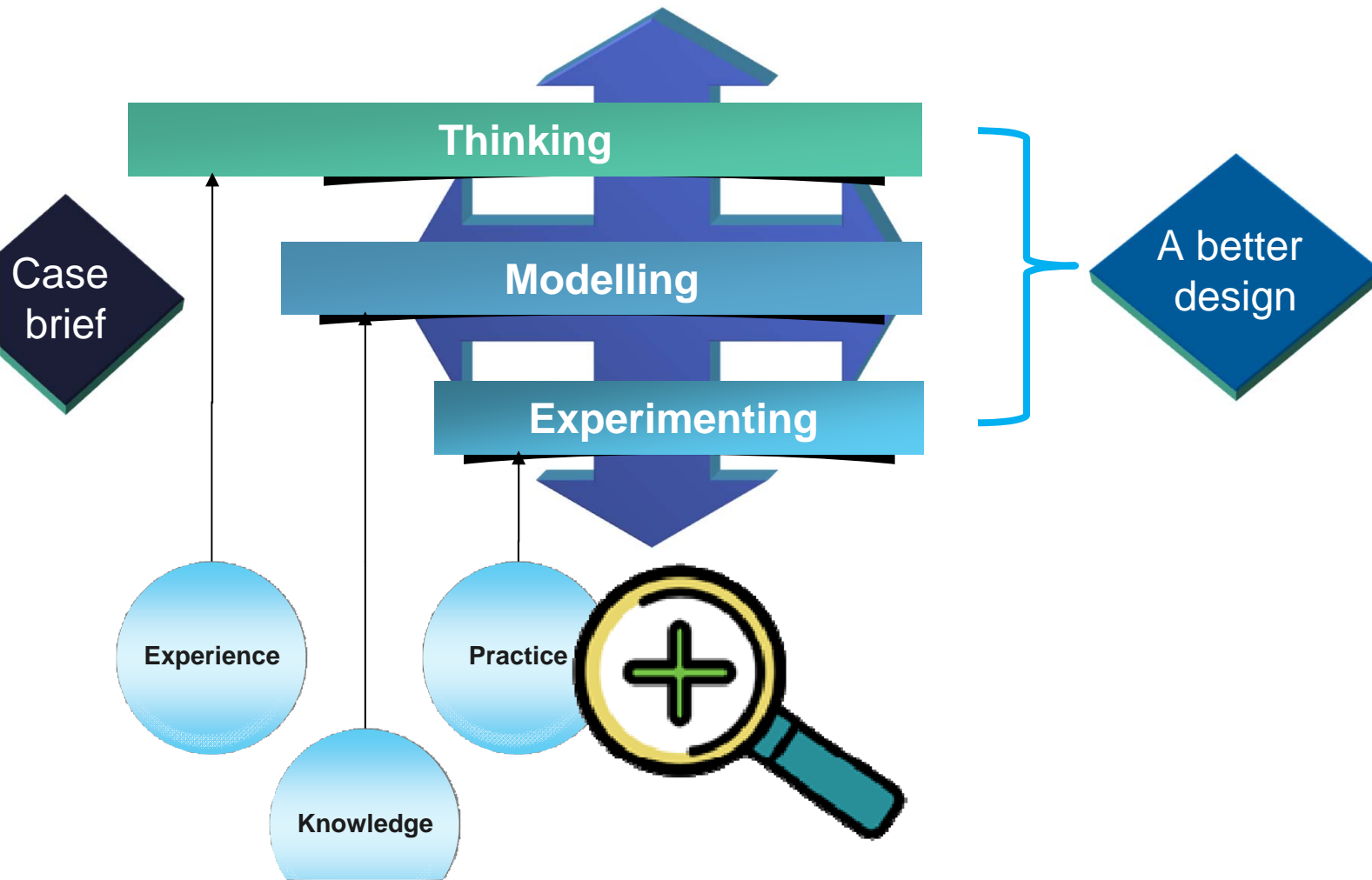




# -A-1 Planning & Evaluation Criteria

Planning & Evaluation

# The design of P-A-1



# Establish your objectives

Assignments are not crystal clear

Why should I do experiment?

My model is right?

What is the right answer?



# The Experiment

Assignment are not crystal clear

Why should I do experiment?

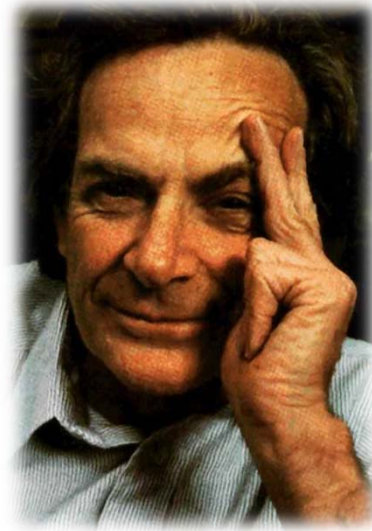
My model is right?

It doesn't matter how beautiful your theory is,

What is the right answer?

It doesn't matter how smart you are.

If it doesn't agree with experiment, it's **wrong**.



Richard Phillips Feynman



Nobel Prize in Physics (1965)

# The purpose of models

Assignment are not crystal clear

Why should I do experiment?

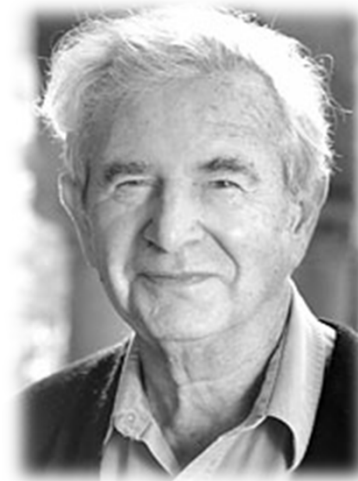
My model is right?

The purpose of models is not to

What is the right answer?

the data but to **sharpen** the

questions.



**Samuel Karlin**



**National medal of science**

# Your model & Your design

Assignment are not crystal clear

Why should I do experiment?

My model is right?

**Don't let the noise of others'**

What is the right answer?

Opinions drown out your own

inner voice



Steve Jobs

n short

Planning & Evaluation



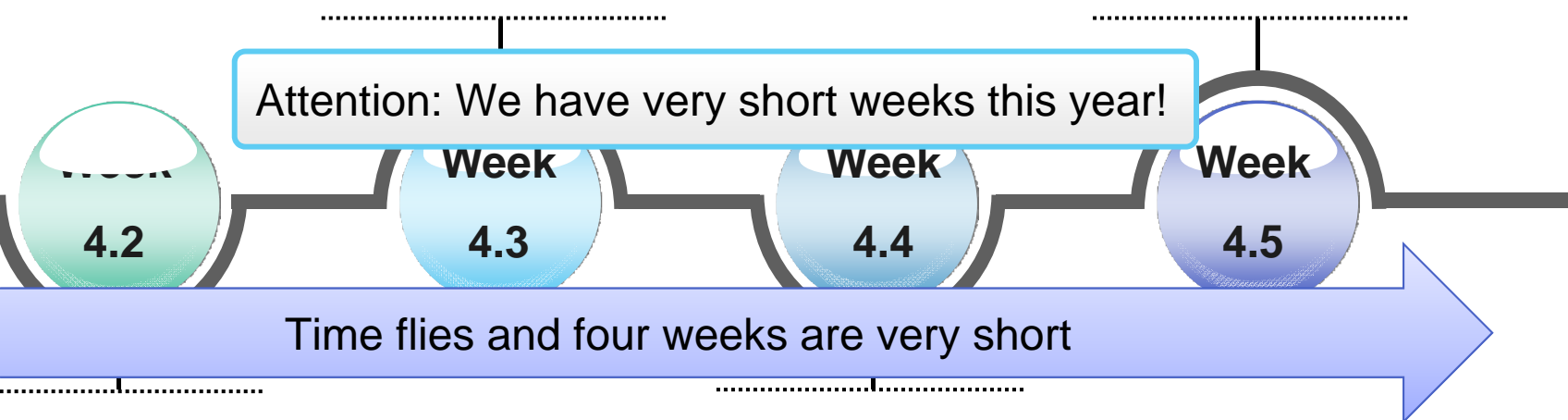
**Issey Miyake**

# Suggested schedule

- Experiments
- Verify / correct your model(s)
- Documentation

- Fine-tuning: models
- Fine-tuning: reports
- Prepare presentations

Attention: We have very short weeks this year!



- Understand the assignment
- Think about the product, list cause-effect,
- Draft abstract mode, list assumptions
- Documentation
- Experiments

- Evaluation and verification
- Finish reports



P-A-1: Thinking before doing

**P-A-1-T, P-A-1-F**

**Modelling**

Thinking

?

System

Cause-effect

Relations

Model

?

Choices

Laws

Parameters

Experiment

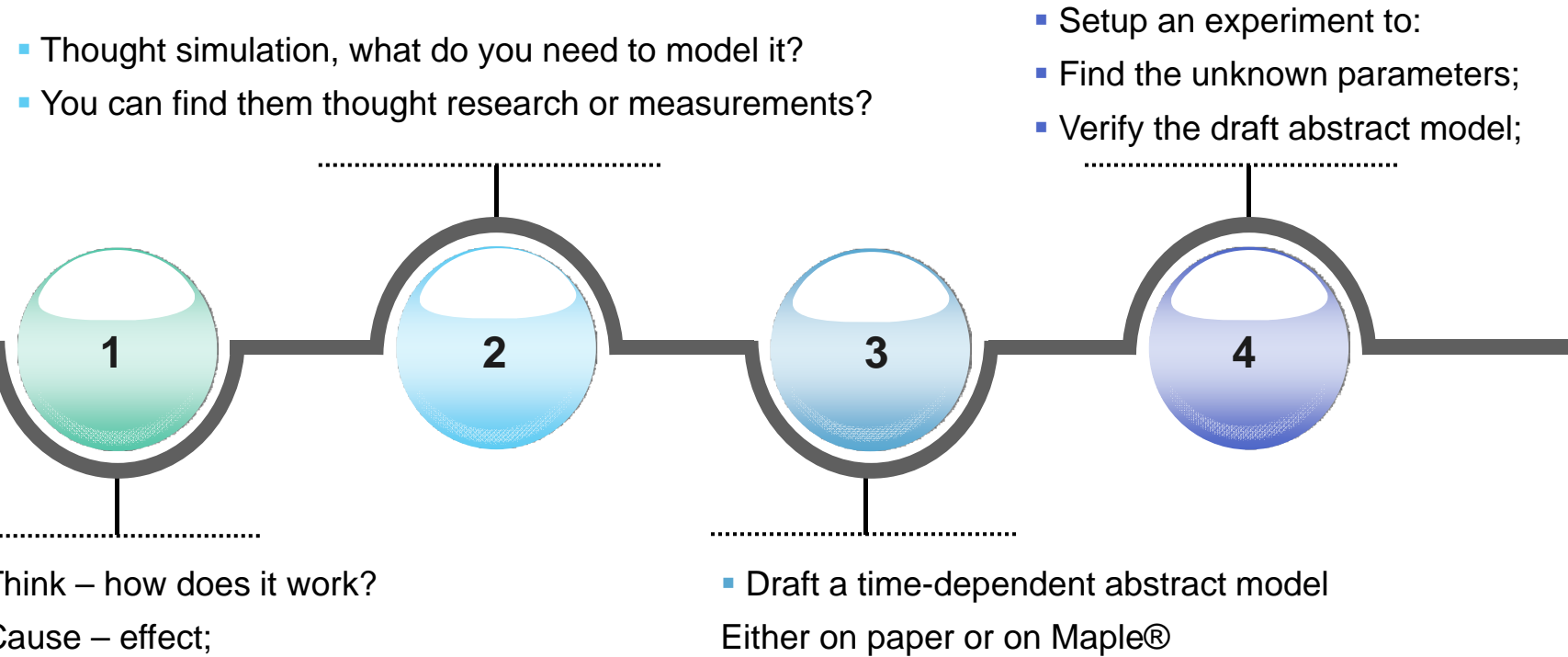
?

What shall I get?

How can I do?

1<sup>st</sup> & 2<sup>nd</sup> experiment

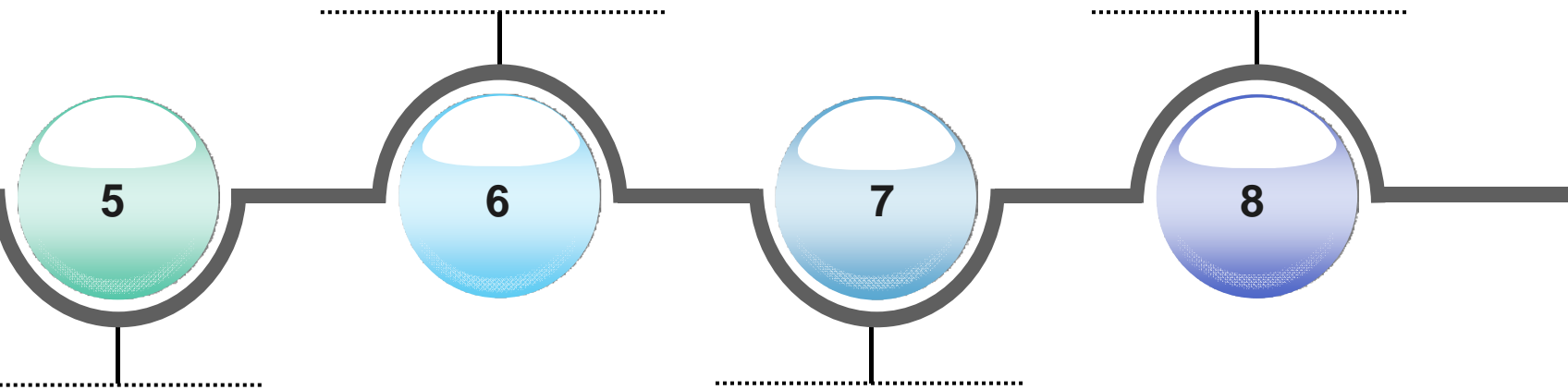
# Steps: Chronological



# Steps: Chronological

- Verify it with your own thoughts and verify it with another experiment by different conditions;

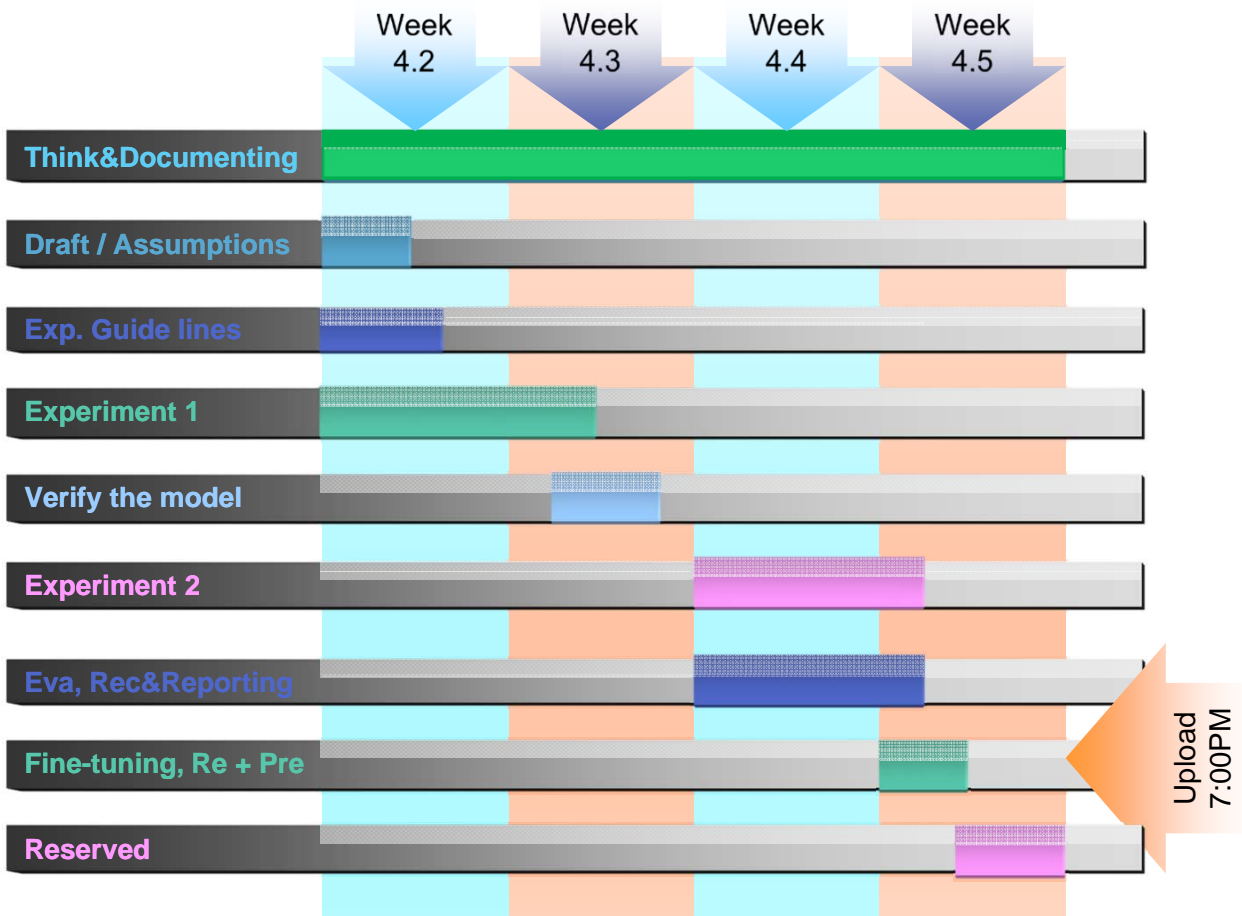
- Hand in reports



...n your abstract model in Maple® or any  
...hich is necessary;

- Evaluate it (and advice on improvement of the design),
- Point out the sources of errors between your models and the measurements.

A good schedule is a must:  
A rough example



# P-A-P Presentation

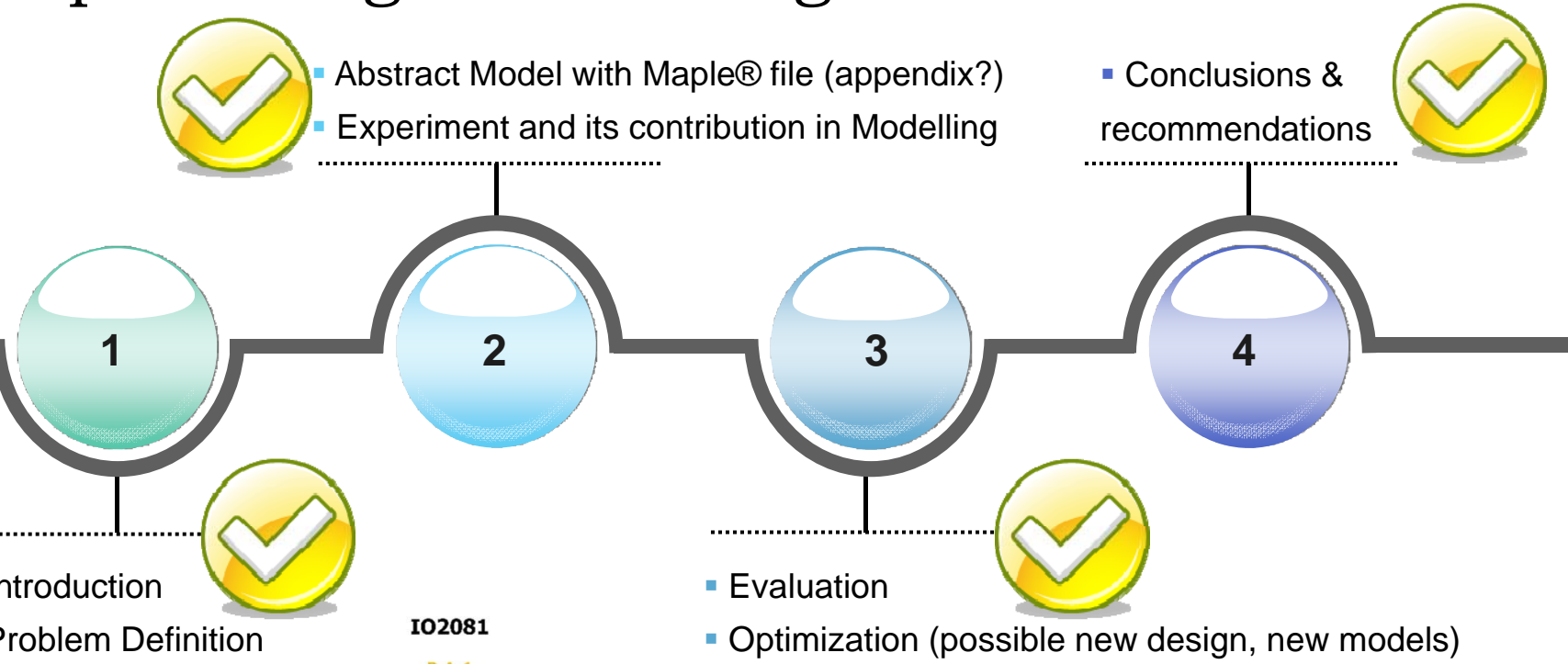
10 minutes



10% of your  
final grades of  
P-A-1

PPT or poster  
+  
Q&A

# Report – Logical: Grading Criteria



Using specified cover page

Group Number:

Team	Studio	Part	Group Number
T	xx	X	xx

Index:

Number:

2081 Index:

< 15 pages is recommended

Hardcopy @ P-A-P



# Hurry at the beginning



@ the beginning



Success in P-A-1



P-A-1: D-Day



D-Day + 1





uccess!

Enjoy Spring

Enjoy modelling