


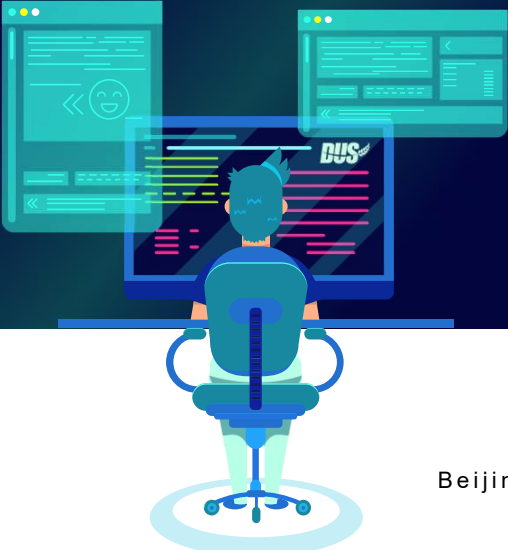
**Technical Working Party on Automation and Computer Programs TWC/39/7****Thirty-Ninth Session****Alexandria, United States of America, September 20 to 22, 2021****Original:** English**Date:** August 19, 2021

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**BIG DATA PLATFORM FOR DUS EXAMINATION***Document prepared by an expert from China**Disclaimer: this document does not represent UPOV policies or guidance*

The annex to this document contains a copy of a presentation on “Big Data Platform for DUS Examination”, prepared by an expert from China, to be made at the thirty-ninth session of the Technical Working Party on Automation and Computer Programs (TWC).


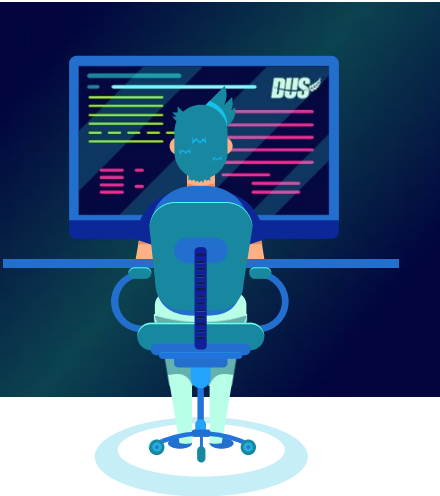
[Annex follows]



# Big Data Platform for DUS Examination

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September 21-23, TWC

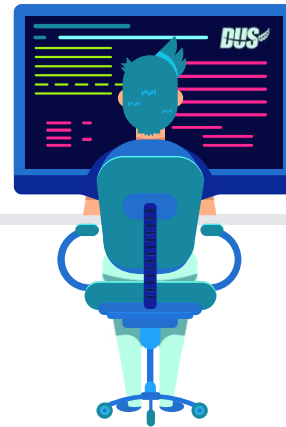


## Contents >>>

- 1. Needs
- 2. Solutions
- 3. Plans



# 01 Needs

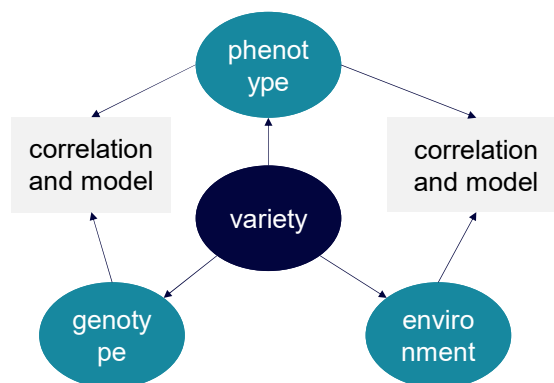
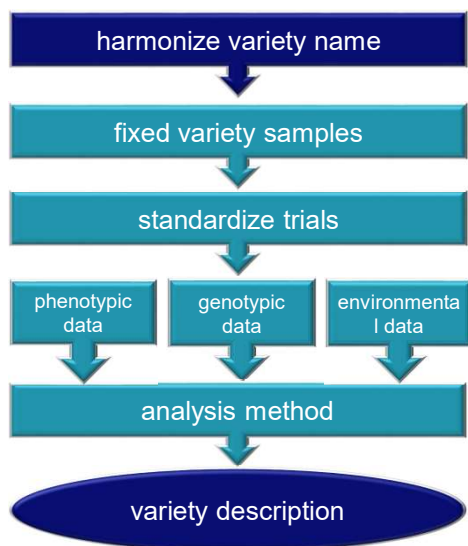


## How to store the big data?



- 1 center and more than 30 stations
- more than 200 Test guidelines
- more than 300 trials and 10,000 samples per year
- 1TB data per year
- TBs picture and environmental data per year
- TBs molecular data per year
- 1TB procedural and log data

## How to ensure the result right?



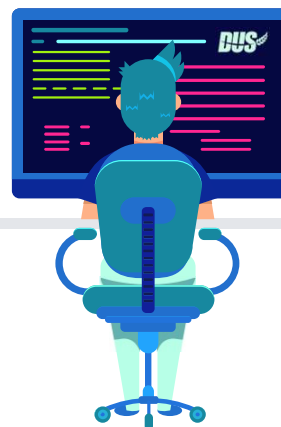
## How to do DUS testing efficiently?



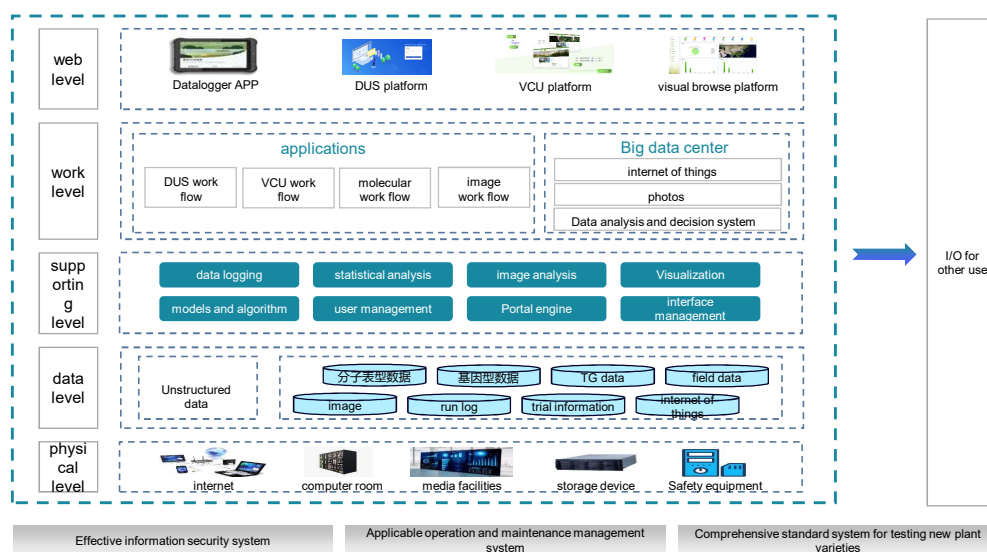
numeration	intellectualization	automation
SAAS platform design: variety database, samples database, Test guidelines database, trials database, photos and videos, morphological data, molecular data, environmental data	auto record, auto remind, auto back tracing, image analysis, statistical analysis, model establishment	unman vehicles and drones, sky and soil watchdogs, auto photography studio , Water fertilizer integrated machine



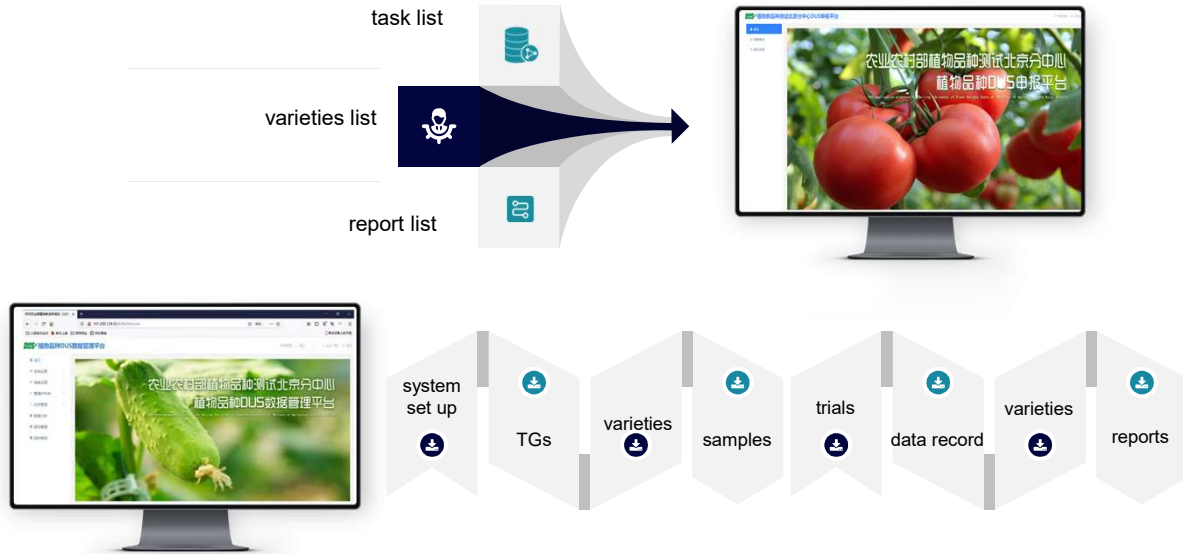
## 02 Solutions



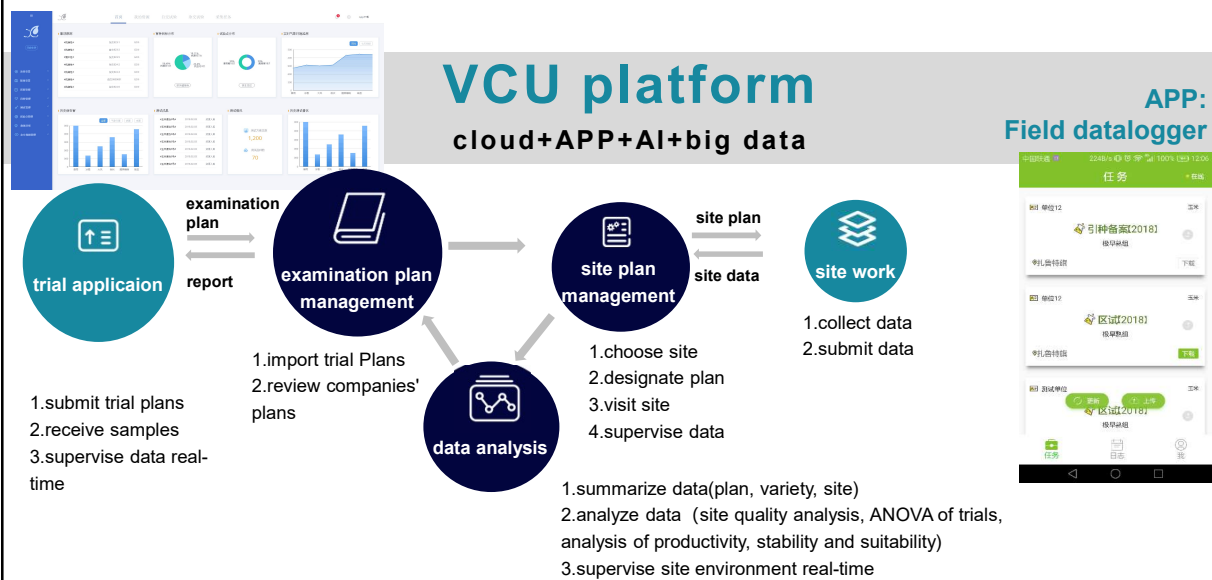
### Structure of whole system



## DUS platform



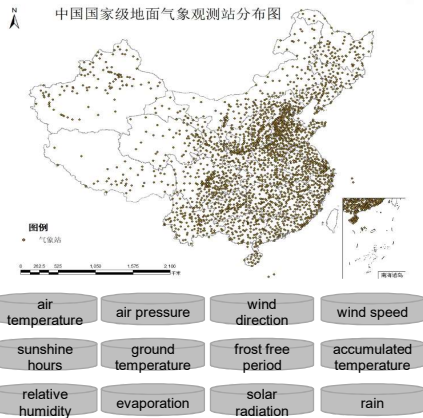
## VCU platform



## environmental data collection



### official weather data



### internet of things

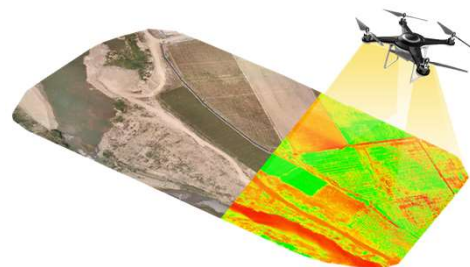
- Field weather station: air temperature, humidity, solar radiation, wind direction, wind speed, precipitation, etc
- Video monitoring station: Crop Growth videos, pictures, etc
- Soil monitoring station: soil moisture and soil temperature (four layers)
- Pest monitoring station: crop pest monitoring, early warning, etc



## taking photos by unmanned drones



Plot vectorization and automatic division, and varieties correspond to plots one by one



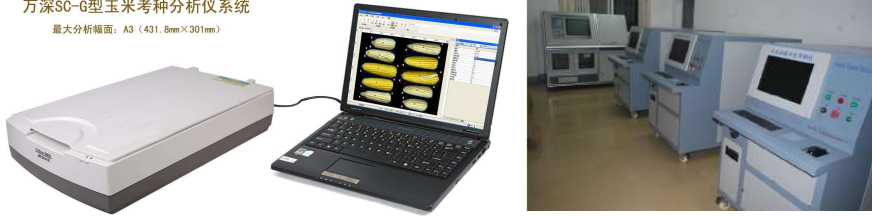
### Monitoring parameters

1. Plant height (maximum, minimum and average)
2. Lodging rate and lodging area
3. Vegetation coverage
4. Chlorophyll content
5. Lai (leaf area index)
6. NDVI (normalized vegetation index)
7. Crop canopy temperature
8. Crop drought index

## taking photos by man or professional box



万深SC-G型玉米考种分析仪系统  
最大分析幅面: A3 (431.8mm×301mm)



基本信息 基本信息 性状代码信息 图片信息 分子信息				
品种名称/图片属性				
品种名称	根	茎	叶	
<input type="checkbox"/> HGBZP2004				
<input type="checkbox"/> HGBZP2005				
<input type="checkbox"/> 标准品种001				
<input type="checkbox"/> 标准品种002				
<input type="checkbox"/> 标准品种003				

## batch image analysis



方案详情

×

分析部位: ☐ 幼苗 ☒ 叶 ☐ 果实

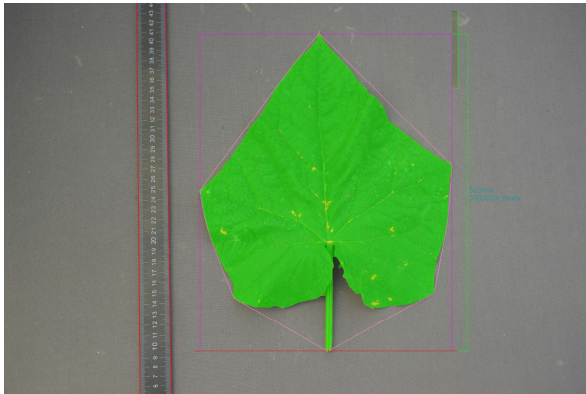
品种	品种类型	图片	分析结果图片	分析结果
HG申请品种1	申请品种			图像名: aee8a40d-1d2f-49c6-a5d6-f322736f37ab.jpg; red: 0; orange: 171; yellow: 17876; green: 3870274; cyan: 0; blue: 0; purple: 0; 叶片长度 (像素): 2938; 叶片长度 (mm): 303.277; 叶片面积 (平方mm): 41597.9
HG申请品种2	申请品种			图像名: ddab3cf8-ed70-48ab-bd5a-311e3ce0e8b8.jpg; red: 0; orange: 171; yellow: 17876; green: 3870274; cyan: 0; blue: 0; purple: 0; 叶片长度 (像素): 2938; 叶片长度 (mm): 303.277; 叶片面积 (平方mm): 41597.9

返回



## cucumber leaf

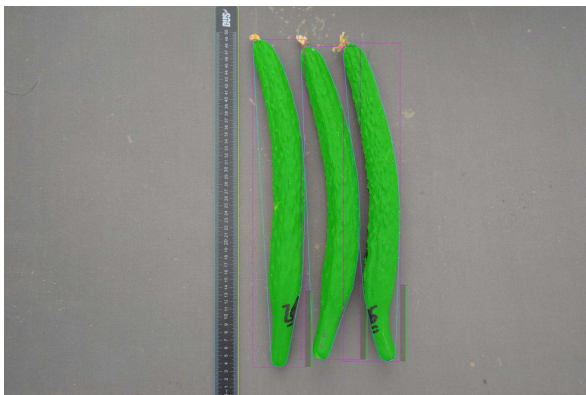
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- Automatically recognize the size of the ruler to calculate the size of the leaf
- Acquire multiple parameters of the leaf including leaf area, width, length, convex hull features, angle of the tip, intensity of dentation of margin, shape of leaf, shape of apex of terminal lobes intensity of green color etc..
- Exploring using AI to automatically dig more traits difficult for human to describe.

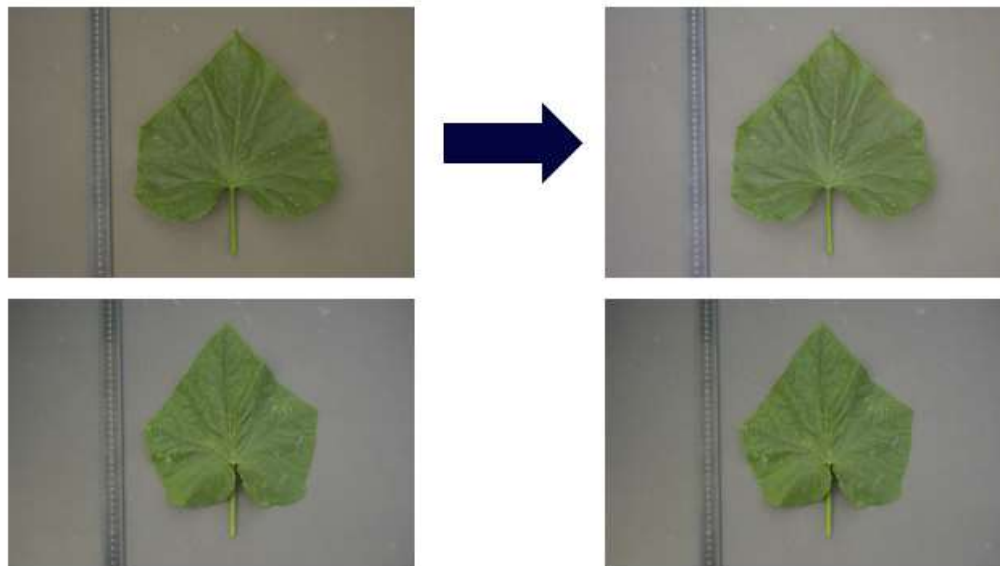
## cucumber fruit

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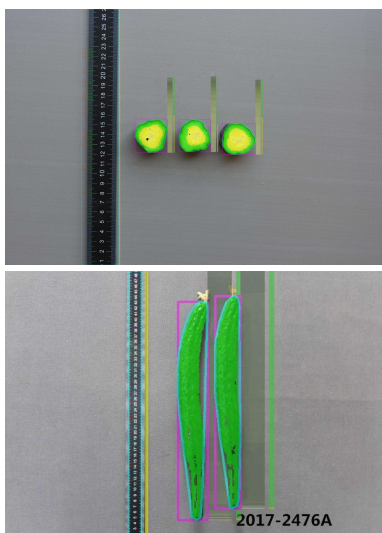


- Automatically recognize the size of the ruler to calculate the size of the leaf
- Acquire multiple parameters of the fruit including fruit area, width, length, shape of calyx end, length of stem end, ground color of skin, secondary color of skin, distribution of secondary color, intensity of glossiness, density of vestiture etc..
- Exploring using AI to automatically dig more traits difficult for human to describe.

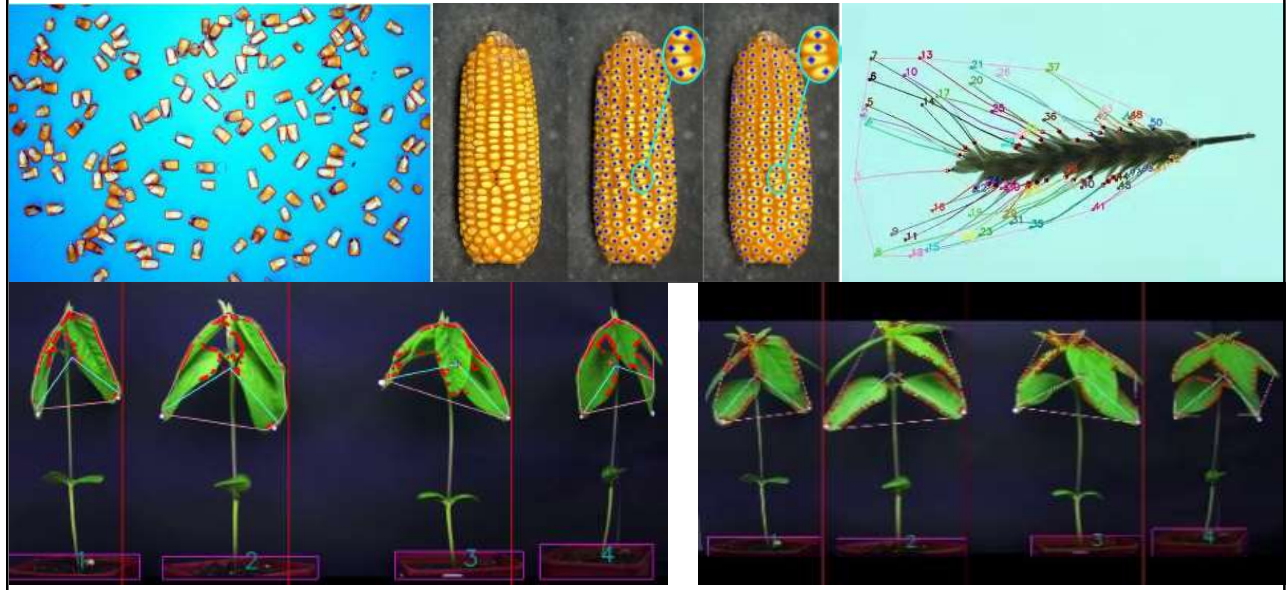
## Color calibration



## Ruler calibration

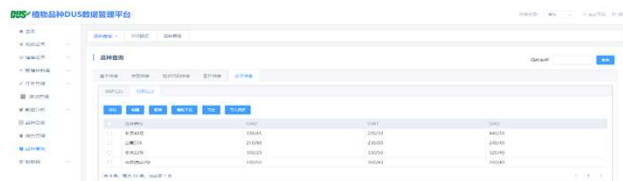
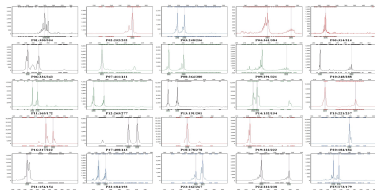


## Other image analysis algorithm



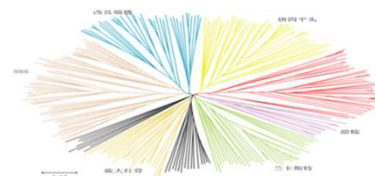
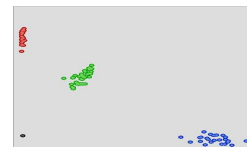
## molecular data

raw data



SSR or SNP data  
management

raw data

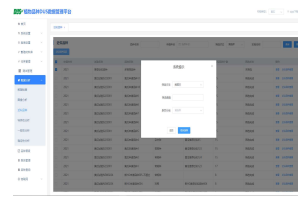


cluster analysis

## solution for distinctness analysis



candidate varieties list



choose method for selecting similar varieties

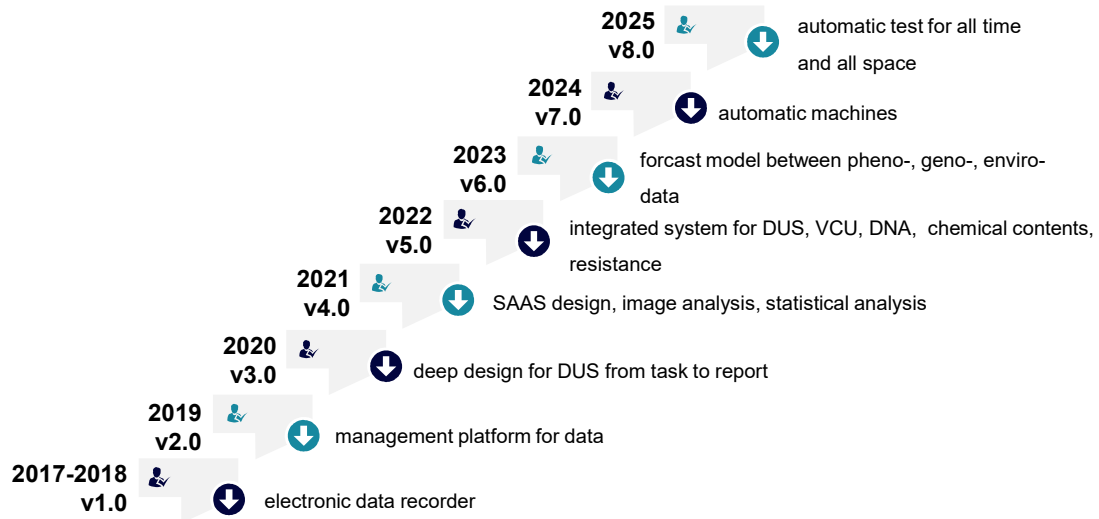
judge distinctness report for detailed information

review the result of selection

## 03 Plans



## Keeping update



**Thank you for your attention!**

