

# Assessing Perceptions of Digitalization of Land Administration and Land Management

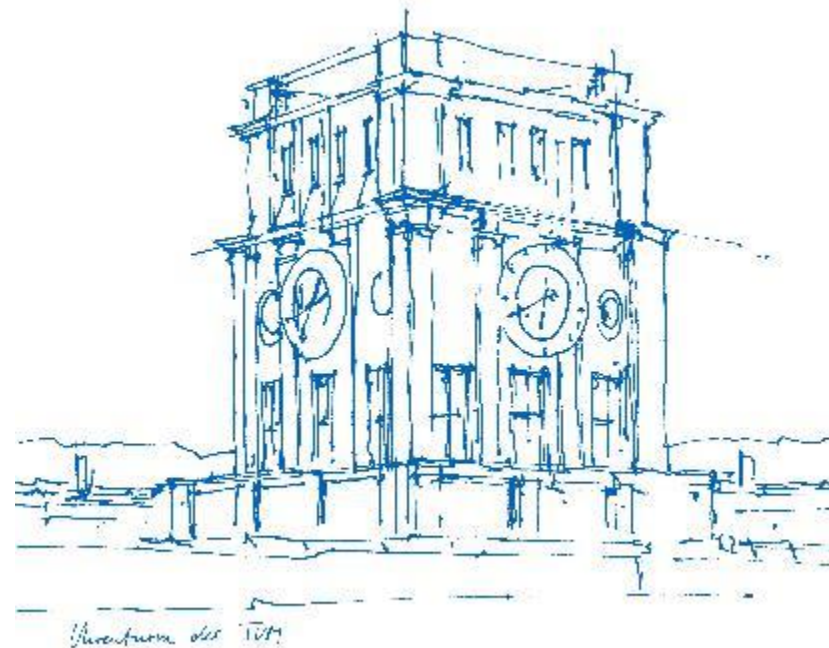
(paper 26 – Geoinformation week)

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## Research problem

- abundant literature on digital government and the effects of digitalization of public (land) information systems
- → largely unknown **how practitioners and affected beneficiaries within these land related (organizational) ecosystems perceive how, how much and why** any of these factors influence the effectiveness or efficiency

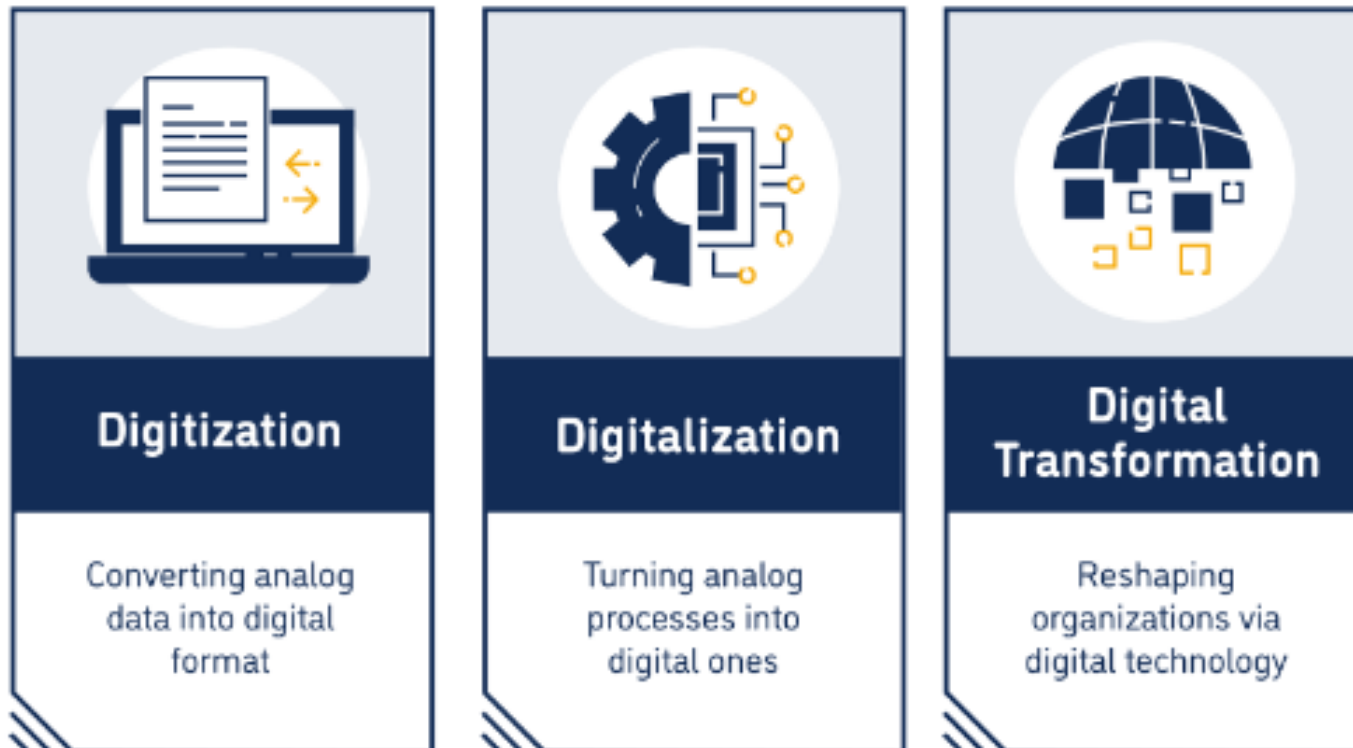
## Research objective

- To **investigate** social perspectives, beliefs and values on preferred and non-preferred (technical and non-technical) practices
- To **analyse** fears and opportunities related to digital technologies which professionals in land related ecosystems use
- To **understand** how to improve the strategies on how to effectively move forward with digitalisation processes

## Land related ecosystems

inter-related and often also inter-organizational processes and dependencies which create and/or derive land related products and services

# Digitalization



# Q - Methodology

...captures subjectivity by categorizing perceptions in any human or organizational system.

The Q methodology procedure contains 7 steps:

1. Identify concourse and volume of debate
2. Define or refine Q sample
3. Select P sample
4. Administer Q sort (using the selected statements) and additional data selection
5. Run factor analysis
6. Interpret and report operant factors
7. Present and discuss findings

# Q - Methodology

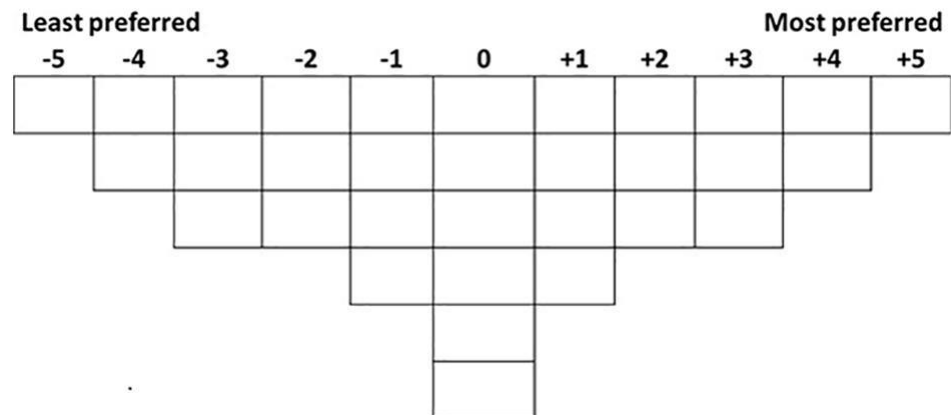
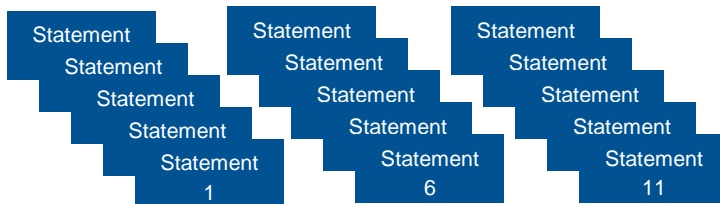
...captures subjectivity by eliciting and categorizing perceptions in any human or organizational system.

The Q methodology procedure contains 7 steps:

1. Identify concourse and volume of debate → **digital transformation and integration of LA and LM**
2. Define or refine Q sample → **25 statements**
3. Select P sample → **promoted via WG and FIG networks**
4. Administer Q sort (using the selected statements) and additional data selection
5. Run factor analysis → **during summer**
6. Interpret and report operant factors
7. Present and discuss findings → **TODAY 😊**

# Q - Methodology

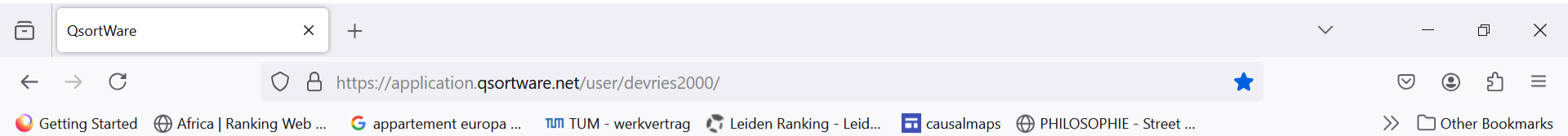
qualitative and quantitative insights into perceptions of digital technologies and digitally-enabled processes





# Capturing Q Sorts - > Q Software

<https://application.qsoftware.net/user/devries2000/>



## Digital transformation and integration of LA and LM / Step 1 of 1...

This second step is the final sort. You have to be specific on which item you find more or less important as compared to other statements. Make sure that each card/statement is allocated to only one box (the maximum number of items is indicated). Each card can only fit in maximum one box. Before you move the statement, make sure you decide for yourself where it would fit best. All statements need to be allocated. There should not be any cards left at the end of the sorting.

Drag the items to the boxes below:

agree	neutral	disagree
<ol style="list-style-type: none"> <li>1 City planning can work better using digital twins.</li> <li>2 Drone technologies can help identify and fine owners of illegal constructions</li> <li>3 Digital land administration makes inequality in land ownership more transparent</li> <li>4 Land management agencies can increase their performance when all their activities rely on digital work processes</li> <li>5 Voluntary geographic information creates openness in and accessibility to land management processes</li> <li>6 Artificial intelligence is the future of generating new land use</li> </ol>	<ol style="list-style-type: none"> <li>1 Drone technology is crucial to monitor changes in the landscape</li> <li>2 Citizens can are encouraged to participate in spatial planning via interactive geoportals</li> <li>3 Smart spatial planning leads to more effective spatial designs.</li> <li>4 Tax officers need to have up-to-date digital tax payment information in the field</li> <li>5 Land agencies are particularly vulnerable to hackers who can change and manipulate land information</li> <li>6 Land data can be manipulated to influence who receives sanctions or fines of illegal land use</li> </ol>	<ol style="list-style-type: none"> <li>1 Land titles should always be made available in both a paper and a digital format.</li> <li>2 Geospatial statistics should be accessible via interactive dashboards</li> <li>3 Digital land administration should be designed to also cater for spatial planning needs</li> <li>4 Geoportals of land agencies should make information available where actors do not adhere to land use plans or do not pay land tax</li> <li>5 Digital integration of land information leads to loss of historically relevant land information</li> </ol>

fully disagree (1)	rather disagree (3)	slightly disagree (5)	neutral (7)	slightly agree (5)	rather agree (3)	fully agree (1)
<ol style="list-style-type: none"> <li>1 Integration of national spatial databases leads to better compliance to plans</li> </ol> <p>OKI</p>	<ol style="list-style-type: none"> <li>1 Work flow efficiency through digital technology positively influences the quality of land administration services</li> </ol> <p>2 item(s) missing</p>	<ol style="list-style-type: none"> <li>1 In digital information ecosystems the interlinkages between land management and disaster risk reduction can be</li> </ol> <p>4 item(s) missing</p>	<ol style="list-style-type: none"> <li>1 Women are more involved in land management when empowered by digital technologies.</li> </ol> <p>6 item(s) missing</p>	<ol style="list-style-type: none"> <li>1 Designing rural development plans should be done by making geospatial technologies and data available at local</li> </ol> <p>4 item(s) missing</p>	<ol style="list-style-type: none"> <li>1 The degree of participation in land management processes strongly depends on the degree of ability to</li> </ol> <p>2 item(s) missing</p>	<p>1 item(s) missing</p>

Continue

# Analysing Q sorts - > Ken-Q online software, <https://shawnbanasick.github.io/ken-q-analysis/>

**Ken-Q Analysis**  
 A Web Application for Q Methodology Version 2.0.1

Ken-Q Analysis brings the interactivity and convenience of the web to Q-methodology. It is a desktop web application, so after the page has loaded there is no further communication with the server. All matrix calculations, factor rotations, and file downloads are processed in your browser. **Your data never leave your web browser.** Therefore, the speed of the matrix calculations, table updates, and image displays will depend on the processing power of your computer. Analyzing smaller datasets will likely be quick and responsive, but when working with large datasets you may experience some deli

**Supported Browsers:**

Google Chrome  
macOS, Windows  
version 53 or newer

Mozilla Firefox  
macOS, Windows, Linux  
version 58 or newer

## 1. Data Input

MS Excel PQMethod KADE Zip Demo

**1. Load Excel Type 1 file**  
 Q sort Data in Columns  
[Click here to get a sample file](#)

Respondent Name and Statement Number	US1	US2	US3	US4
-4	18	30	10	10
-4	18	16	16	16
-3	14	30	14	14
-3	30	4	11	11
-2	18	18	20	20
-2	8	31	18	21
-2	31	18	21	21
-2	31	31	21	21

Drag and drop Excel file here, or click to select

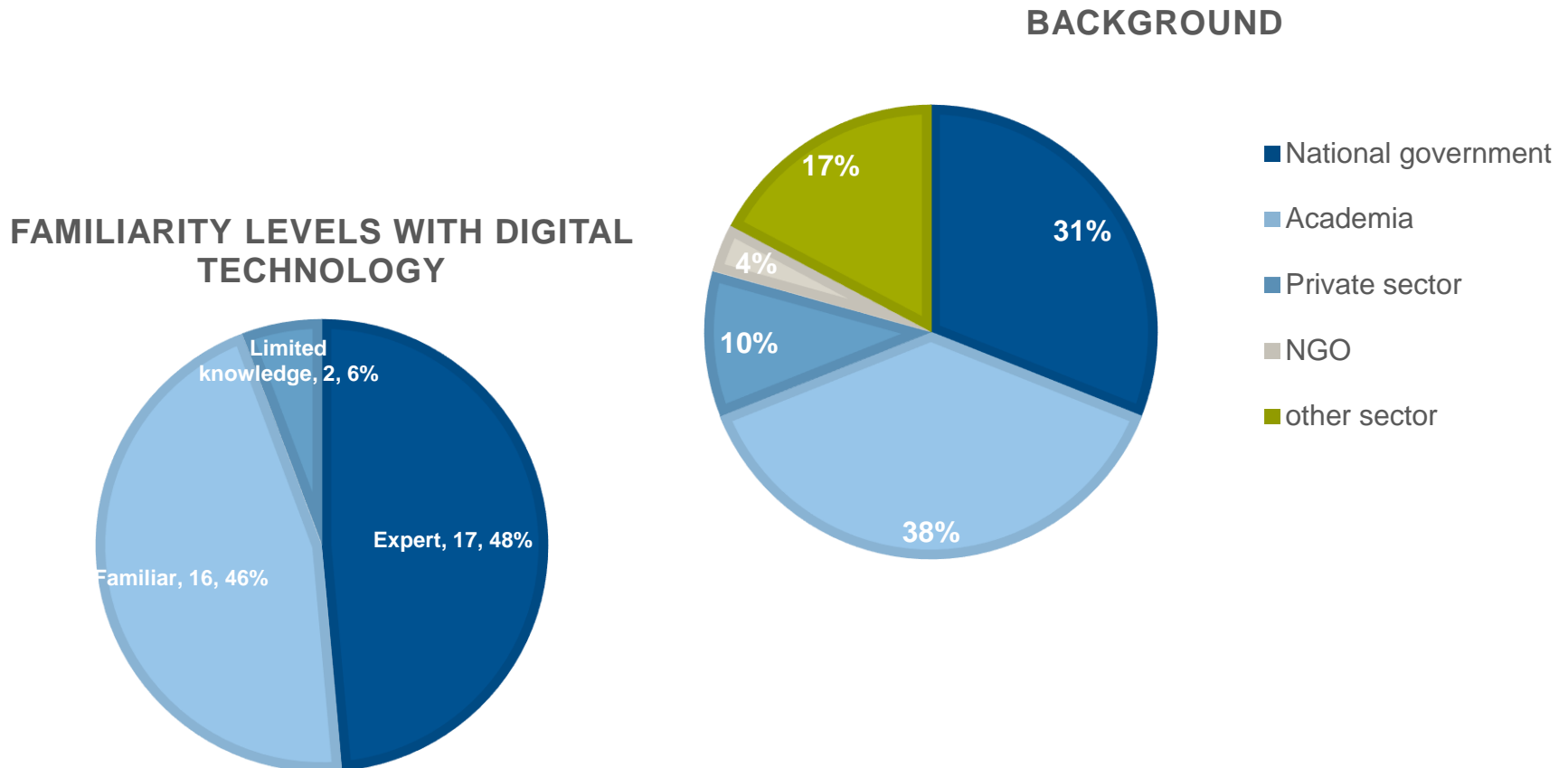
**2. Load Excel Type 2 file**  
 Q sort Data in Rows  
[Click here to get a sample file](#)

	US1	US2	US3	US4
US1	-1	0	-2	0
US2	-1	0	-1	-3
US3	2	-2	-3	4
US4	3	1	-3	-1
JPS	-4	-1	3	-1
CA6	1	-3	0	3
LK7	2	0	-2	1
US8	-2	2	0	-3
FR9	3	1	0	1

Drag and drop Excel file here, or click to select

# Results – statistics of participants

35 responses, from 23 countries (from 5 continents).



## Results Q sorts

Number	Statement	Ranking value
21	Digital integration of land information leads to loss of historically relevant land information	0,054
9	Tax officers need to have up-to-date digital tax payment information in the field	0,063
7	Geospatial statistics should be accessible via interactive dashboards	0,091
23	Fake information can result in land related protests and advocacy	0,114
6	Smart spatial planning leads to more effective spatial designs.	0,143
20	Land agencies are particularly vulnerable to hackers who can change and manipulate land information	0,18
14	Integration of national spatial databases leads to better compliance to plans	0,201
22	Land data can be manipulated to influence who receives sanctions or fines of illegal land use	0,268
5	Citizens can be encouraged to participate in spatial planning via interactive geoportals	0,359
2	Drone technology is crucial to monitor changes in the landscape	0,376
18	Geoportals of land agencies should make information available where actors do not adhere to land use plans or do not pay land tax	0,393
11	Designing rural development plans should be done by making geospatial technologies and data available at local levels.	0,424
19	Voluntary geographic information creates openness in and accessibility to land management processes	0,453
13	Digital land administration should be designed to also cater for spatial planning needs	0,493
8	Digital land administration makes inequality in land ownership more transparent	0,506
15	The degree of participation in land management processes strongly depends on the degree of ability to work with geospatial data	0,523
1	City planning can work better using digital twins.	0,581
25	Blockchain technology can increase the trust in land administration systems	0,648
12	In digital information ecosystems the interlinkages between land management and disaster risk reduction can be improved	0,717
17	Work flow efficiency through digital technology positively influences the quality of land administration services	1,056
10	Women are more involved in land management when empowered by digital technologies.	1,086
4	Drone technologies can help identify and fine owners of illegal constructions	1,131
16	Land management agencies can increase their performance when all their activities rely on digital work processes	1,222
24	Artificial intelligence is the future of generating new land use plans	1,249
3	Land titles should always be made available in both a paper and a digital format.	1,941

## Ranking values per statement

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## Ranking values per statement



## Results Q sorts

Statement Number	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5
	Z-score	Z-score	Z-score	Z-score	Z-score
1	-0,1	1,71	1,72	1,73	1,99
2	1,18	-0,29	0,59	0,24	1,39
3	1,09	-2,25	-1,05	0,87	1,27
4	2,12	0,39	0,38	-1,2	0,85
5	-0,88	0,74	0,77	0,37	0,3
6	0,59	0,58	1,36	0,74	1,43
7	0,3	0,41	0,59	0,14	-0,3
8	1,46	0,26	-0,49	1,04	-0,03
9	-0,8	-0,17	-0,57	-0,61	-0,17
10	-1,62	-0,79	1,29	-0,83	0,51
11	0,94	0,62	2,03	1,03	0,04
12	0,52	0,46	-0,66	1,27	-1,06
13	0,89	0,24	-0,21	0,94	-0,93
14	0,5	0,38	-0,59	0,22	-0,46
15	-0,14	0,06	-1,21	-1,52	0,3
16	-0,3	1,87	-0,46	0,14	-1,52
17	-0,28	1,63	-1,26	-0,95	0,34
18	-0,3	-0,17	-1,29	-1,35	0,21
19	-0,5	-0,47	-0,13	0,78	1,14
20	-1	-0,55	-0,95	0,15	-0,34
21	-1,96	-1,74	-1,36	-1,9	-1,48
22	-0,96	-1,7	-0,13	-0,77	-0,55
23	-0,36	-0,43	-0,21	0,52	-0,13
24	0,72	-0,17	0,77	-1,42	-1,99
25	-1,09	-0,63	1,05	0,38	-0,81

Factor scores per  
statement



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Factor scores per statement

## Factor interpretations

Factor (a systematic belief system)	Has preference for / likes / considers very important/relevant	Rejects / does not like /does not consider very important/relevant
1	(4) Drone technologies can help identify and fine owners of illegal constructions	(21) Digital integration of land information leads to loss of historically relevant land information
2	(16) Land management agencies can increase their performance when all their activities rely on digital work processes	(3) Land titles should always be made available in both a paper and a digital format.
3	(11) Designing rural development plans should be done by making geospatial technologies and data available at local levels.	(21) Digital integration of land information leads to loss of historically relevant land information
4	(1) City planning can work better using digital twins.	(21) Digital integration of land information leads to loss of historically relevant land information
5	(1) City planning can work better using digital twins.	(24) Artificial intelligence is the future of generating new land use plans



## Creating comprehensive view from factor interpretations

Factor (systematic belief system)	Generic view / perception / opinion
1	Digitization needs to focus on fostering formalisation, enforcement of unified rules and reduction of existing informalities
2	Digitization needs to primarily focus on improving work efficiencies; paper / manual processes need to be abolished
3	Digitization needs to support reaching the goals of future rural and urban development
4	Digitization needs to enhance the processes of future spatial planning and design
5	Digitization should not lead to the loss of control of (the land use) planning processes

## Variety among countries

The first results of the Q survey show a high degree of variation of opinions on how and why digitalization occurs and in which direction it should develop.

There is also a low degree of correlation between participants (perhaps due to different levels of digitalization maturity).

Nevertheless, the correlation between participants from the same country is also low.

## Conclusions – consensus in views and perceptions

- technological changes or advancements, such as the use of drones instead of aerial photographs or satellites, are seen as having a **positive influence on the transition** to make land administration more digitized.
- particular drones foster new types of applications and services, and are considered one the **main driver of digital transformation**
- given the low value given to paper-based information and the maintenance of historical records in conventional ways shows agreement in the view that that **digitalization will make the information itself better, regardless of how the information is acquired**

# **Thank you!**

**Questions, comments and feedback are welcome**

**Walter T. de Vries**

**Claudia Lindner**

**Walter Dachaga**