P5 (10TH July-2018) - TU DELFT

SMART REAL ESTATE MANAGEMENT

FROM DATA TO VALUE

IN REAL-ESTATE INVESTMENT MANAGEMENT

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OVERVIEW

Real estate investment (Dutch Office market):

WHY !

- ‘Real estate is the largest asset class in the world’

Arthur Segel- Harvard business school Professor

- Real estate represents about **one-half of the world’s economic wealth**, and forms big part of shaping the economy

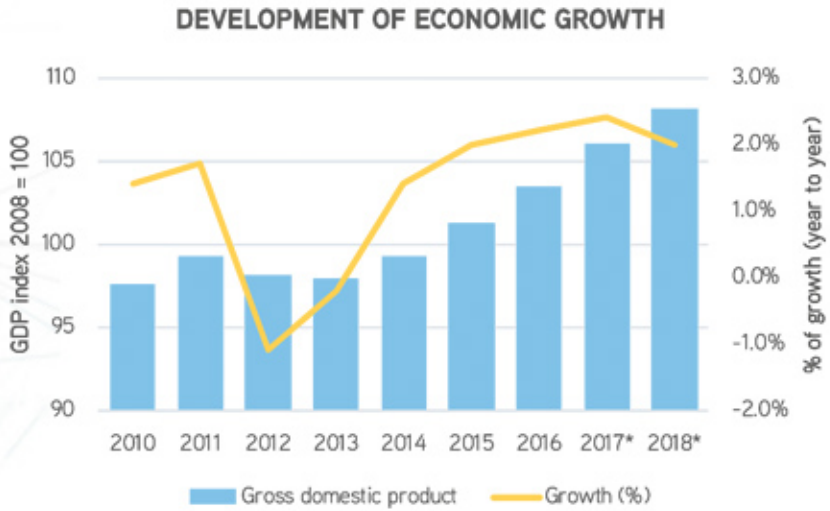


Fig.1. GDP in the Netherlands (Colliers int., 2017).

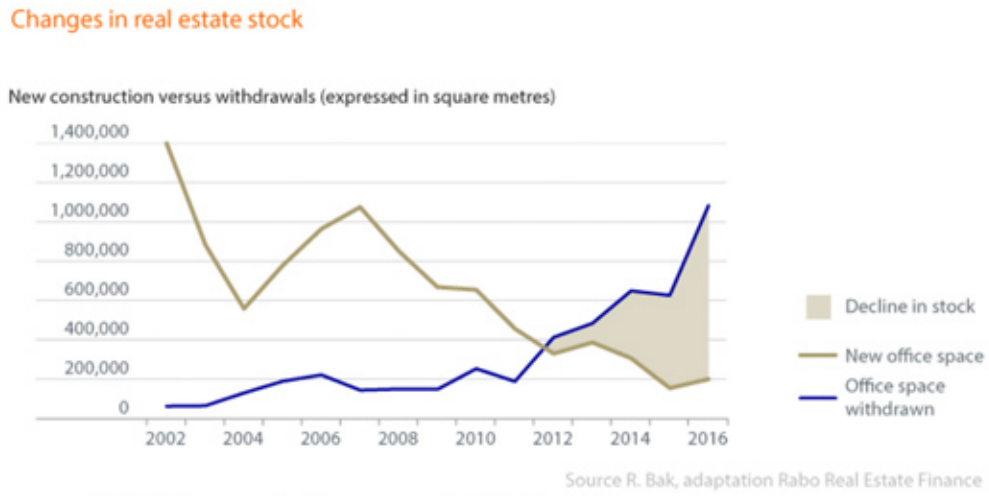


Fig.2. Changes in office space stock (Bak, 2017).

1- INTRODUCTION - RESEARCH PROBLEM:

REAL ESTATE VS CONTEXT

REAL ESTATE IS TRADITIONAL MARKET !

1- INTRODUCTION - RESEARCH PROBLEM:

'From a general real estate point of view, I think it should be but for the company it is a bit risky?, who is going to invest in it and who is going to benefit from it? ' I am with transparent, but the way is a bit tricky'

Martijn Martijn (W.M.) de Jager – CBRE

'Yea, I am fine with that. But I think what you now see that it takes a lot of time and resources '

Raphael Rietema - CBRE

'I am with it. I think eventually it will be better for the real estate market in the Netherlands, because it will enhance trust between parties, liquidity which is a good thing,…. On the other hand, our competition will become much harder'

Fabian Marchand – Carin Real estate

"I think it is important, yes,…, I don't know why shouldn't you?!,.. I think your starting point should be transparency'

Agnes Wittink- RVGB

'I think it is better for the market if it is, …, but you know it is not my goal to make the market more transparent, but it is a side effect of what I am doing.'

Christiaan Swen- Vastgoeddata

' No, because then the fun is gone, then the interesting side of investing and trying to get your hands on a deal is gone, it becomes purely emotionless, then the whole idea of doing deals and the whole risk and return is gone, so I don't believe in it'

Maurits van Schie- PNB Paribas real estate

PROPONENTS

'In the last crisis, banks had huge loses because they didn't have enough information, investors are making a lot of money because they know something that we don't know, and the data needs to get transparent'

Martijn Witvoet – ABN AMRO bank

'Yes, I do. I would like to see that everything that I do manually now is available on data base that contains all the transactions and required information'

Sjors van Iersel – Spring real estate

'for Geophy, we are working towards transparency , we think that it will change the dynamics of the market which will open opportunities. '

Brittany Burns - Geophy

'It is also good for the office market to make the data available'

Anna Mira Brethouwer - Geophy

'we are really in favour of more transparency, because we think smart cities are much better than smart buildings and if you want to create smart cities you have to share data. So that is something that we see for the future, on the other hand, we have privacy issues, so we cannot share certain data, we simple are not allowed to share certain data,..'

Jeroen Jansen- Bouwinvest

OPPONENTS

'No I don't agree. Then you lose a lot of opportunities. If you are better than average. And that is why the good side of the market will not cooperate with that.'

Sebastiaan van Nimwegen - CBRE

'It shouldn't be that transparent. The only difficulty is that If all people have the same information and if everyone is using big data, then the real estate will be like buying a share on the stock market due to the public available information.'

Martijn van den Eijnden – Carin Real estate

'No, this market is totally different than a typical governmental public market. Because we also have our advantage because we know certain information that other parties do not know,……. but at the end I am with transparency as it has more advantages than disadvantages'

Ivar Hillerstorm – Spring real estate

DATA IS THE BASIS FOR INFORMATION

'You can have data without information, but you cannot have information without data'

Daniel Keys Moran (NT, 2015).

1- INTRODUCTION

- HYPOTHESIS:

'Big data and smart tools enhance the investment decision making process of office property for institutional real estate investors by reaching more accurate and informed decisions based on data and reliable analysis'

- RESEARCH OUTCOME:

The expected final product of this research is a developed integrated **decision making model** and flow chart that involves big data methods and techniques for making more **informed** real estate investment decisions 'Dutch office market'.

- RESEARCH QUESTIONS:

Main question:

- How to make use of big data for achieving more informed real estate investment decisions?

Sub- Questions:

- Which acquisition criteria are affecting the real estate investment decisions for institutional investors?; and what type of data is required and available?
- How could big data tackle the current problems in the real estate industry?
- What are the main challenges for applying big data to the real estate industry?
- What are the opportunities of using big data and predictive analytics in real-estate investment decisions?

ACQUISITION CRITERIA (OFFICE SPACE):

ECONOMIC FEATURES	LOCATION FEATURES	BUILDING FEATURES		CONTRACT FEATURES
1- Vacancy Rate. 2- Gross Domestic Product (GDP). 3- Absorption Rate. 4- Office stock & supply. 5- Office Employement Rate.	1- Distance to CBD and important places. 2- Distance to public transportation and railways. 3- Distance to High ways (Road infrastructure). 4- Parking. 5- Charisma of surroundings & Environmental amenities	1-The building size. 2- Building materials and its quality. 3- Building design. 4-Building Condition: age and structure 5- Building compatibility and formity with its surroundings. 6- Energy efficiency. 7- Parking. 8- Communication technology 9- Total floor area. 10- Number of floors.	11- The percentage of common space. 12- The percentage of unused space . 13- The number of elevators. 14- Building amenities and services. 15- LFA/GFA ratio. 16- Architectural quality. 17- Lighting. 18- Privacy. 19- Ceiling height. 20- Availability of external view.	1- Contract period (years). 2- Duration of rent free.

'GDP is is the market value of goods and services produced within a selected geographic area (usually a country) in a selected interval in time (often a year)' (Leamer, 2010).

DECISION MAKING MODELS (EXAMPLES):

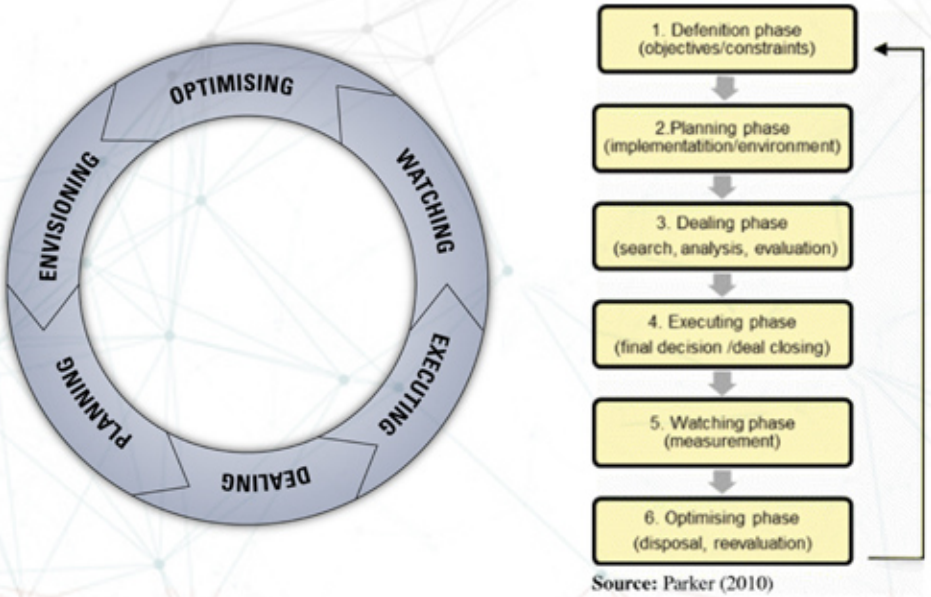


Fig.3. Mapping the Real Estate Portfolio Management Process (Parker, 2010).

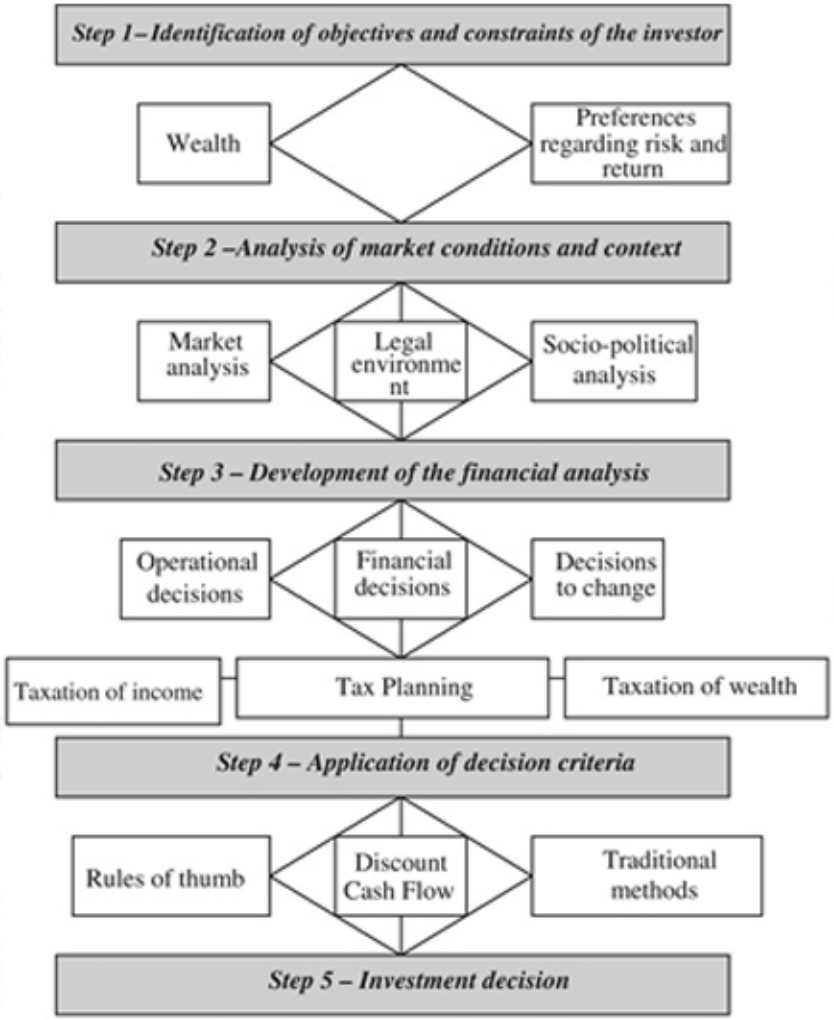


Fig.4. A model of decision-making process relating to the generic investment (Manganelli, 2015).

BENEFITS OF BIG DATA IN REAL ESTATE:

"Nobody really wants big data, … what they really want is big impact and big results"
Micheal dell, Dell corporation (T.V.G., 2012).

1- Property mangement:
Monitoring the building performance: air pressure, internal environment, etc.

2- Portfolio mangement:
Holistic overview for faster actions (proactive management)

3- Smart marketing:
Google-like searches
connecting potential buyers to products around the world (E-commerce)

4- Risk management:
calculating and determining different kind of risks based on data.

5- Preventing money laundering:
Suspicious Activity Reports (SAR) are always needed.
Defining all involved stakeholders in high transactions.

6- Future smart cities:
a city that provides mobility, green technology, personalized medicine, safe services, clean water, traffic management, etc,
- generates massive amount of daily data.

BENEFITS OF BIG DATA IN REAL ESTATE INVESTMENT MANAGEMENT:

Identifing the financial burden of a potential investment based on modelling property appreciation, maintenance costs, capital outlay, potential tenants, demographical prime growth areas and marketing expenses,

Make the same decisions faster

Make better decisions

Make the same decisions cheaper

Make innovations in products and services

CHALLENGES OF ADAPTING BIG DATA

COMPLEXITY

Data is complex and unstructured.

Data complexity:
Unstructured format and different type

Computational complexity:
new computing approaches are needed.

System complexity:
Big data requires very complex computing algorithms. (system architecture)

PRIVACY & SECURITY

Critical ethical and moral debate.
Personal information.

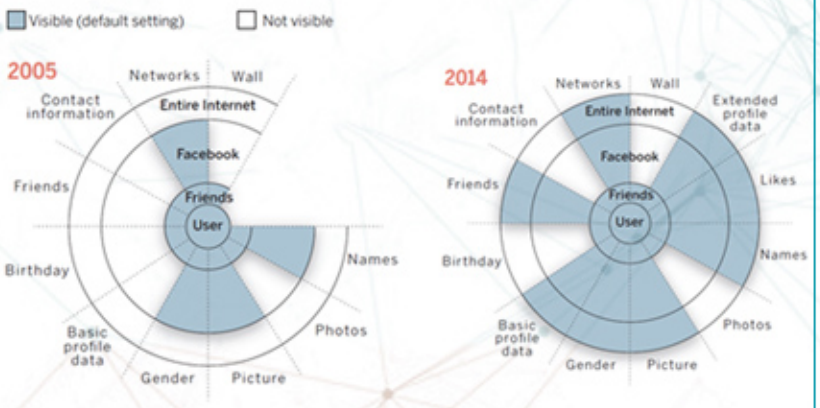


Fig.6. Defult visibility settings in social media over time (Acquisti et al., 2015).

- Indivduals should control their actions on the internet.
- Privacy policy are required.

CULTURE & MINDSET

Changing the way people think about data and their culture.

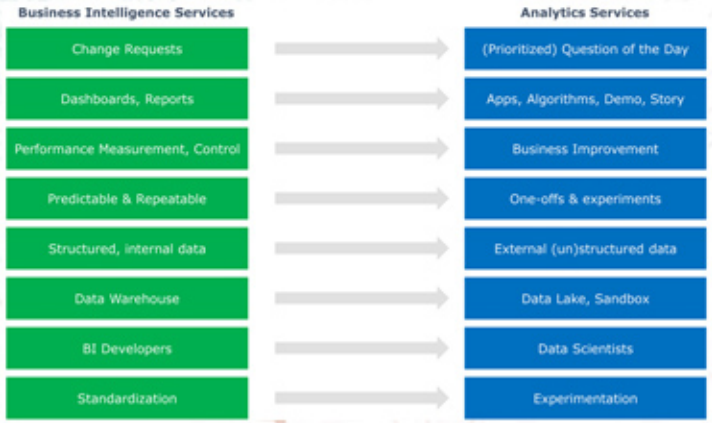


Fig.7. BI vs Analytical services (Schalekamp, 2017).

People should believe in data and its value to the organization.

HOW TO ADAPT BIG DATA STRATEGY ?

Strategy

People

Process

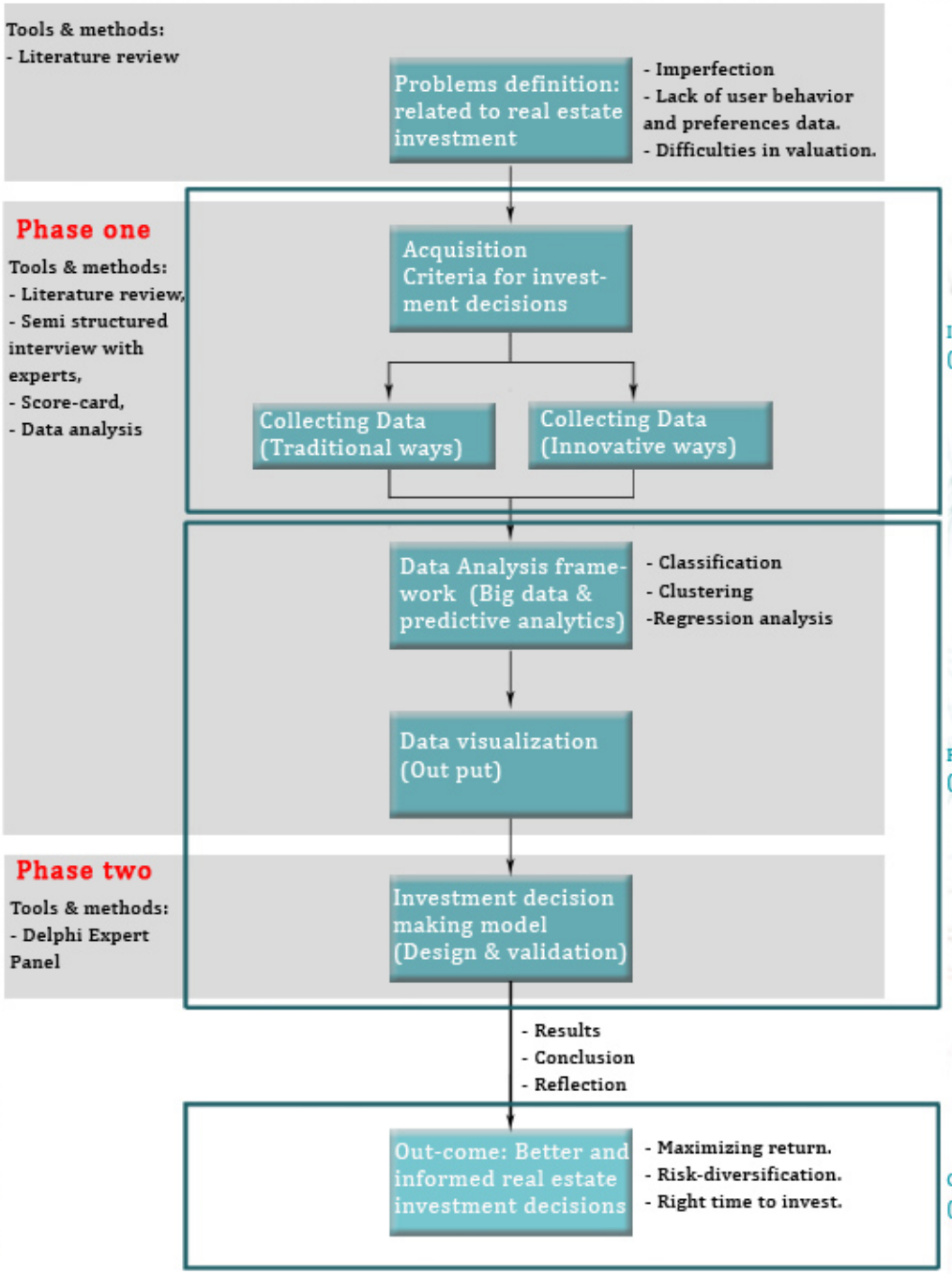
Data

Technology

3- RESEARCH METHODOLOGY

- RESEARCH SCHEME:

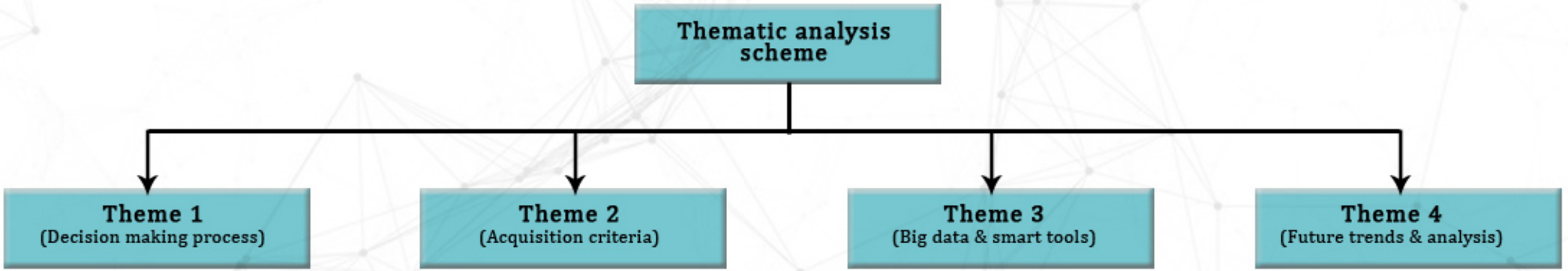
Empirical research (Qualitative research)



- Data Analysis techniques:

Thematic analysis
Narrative analysis

3- RESEARCH METHODOLOGY



Keywords:

1- Process in practice
2- Excluded/ added steps t o theory.
3- Average investment time horizon
4- Traditional ways
5- Innovative methods

Tools:

- Interviews

Keywords:

1- Current criteria (Kpi's)
2- Added criteria in 10 years
3- Excluded criteria in 10 years
4- Data Availability
5- Gut feelings & emotions

Tools:

- Interviews
- Score-cards
- Reports

Keywords:

1- Benifits to real estate investment
2- Main challenges
3- Data 'accurate, up to date'
4- Data accuracy assurance.
5- Mindset Acceptance
6- Social media
7- Techniques for collecting and processing data
8- Techniques for visualizing
9- 100% Automation (Agree/disagree)
10- the new role of appraisals

Tools:

- Data companies, tools, and reports
- Interviews
- Score-cards

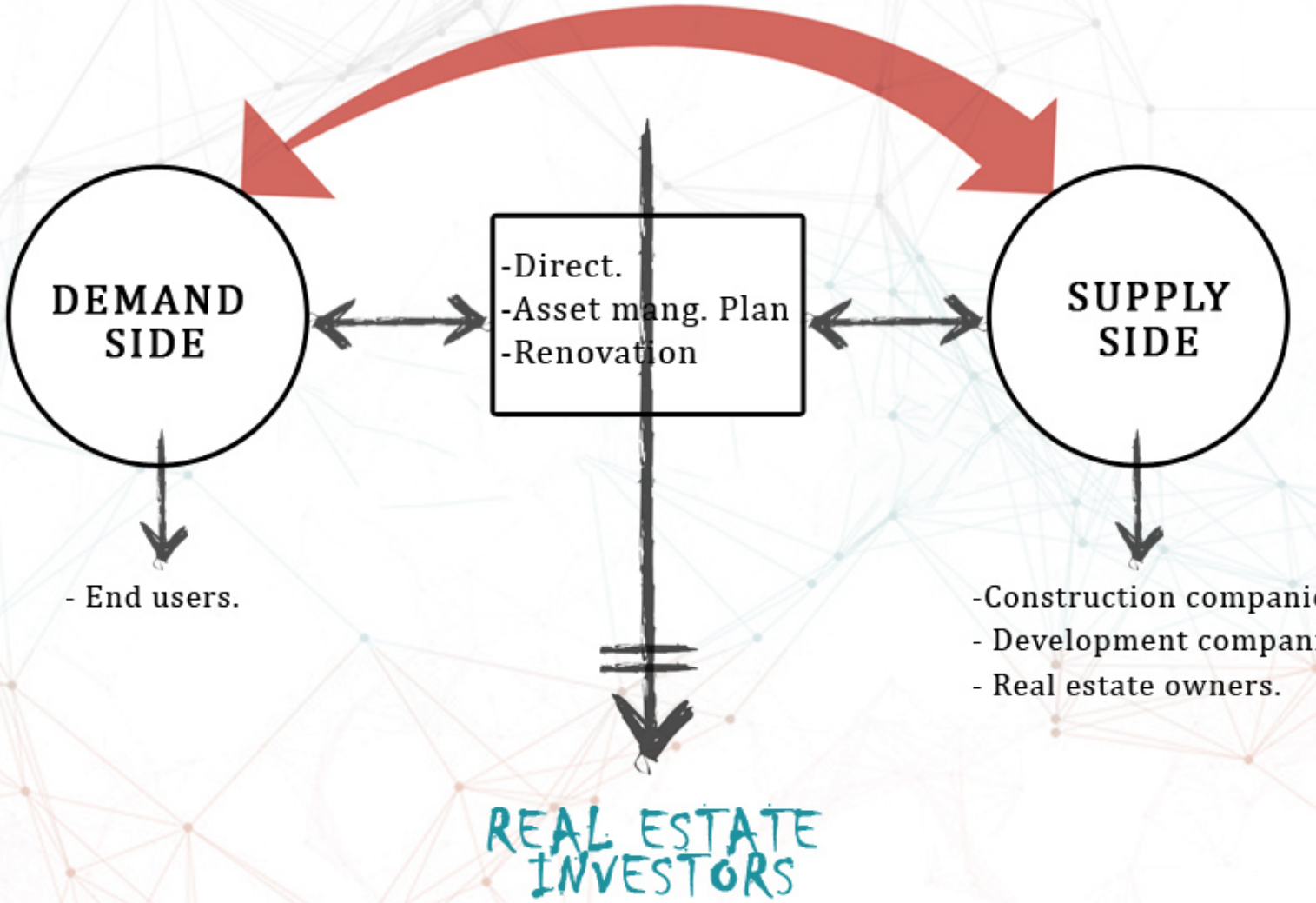
Keywords:

1- Most likely future trends
2- The office space in 10 years

Tools:

- Interviews
- Reports

- RESEARCH SAMPLE:



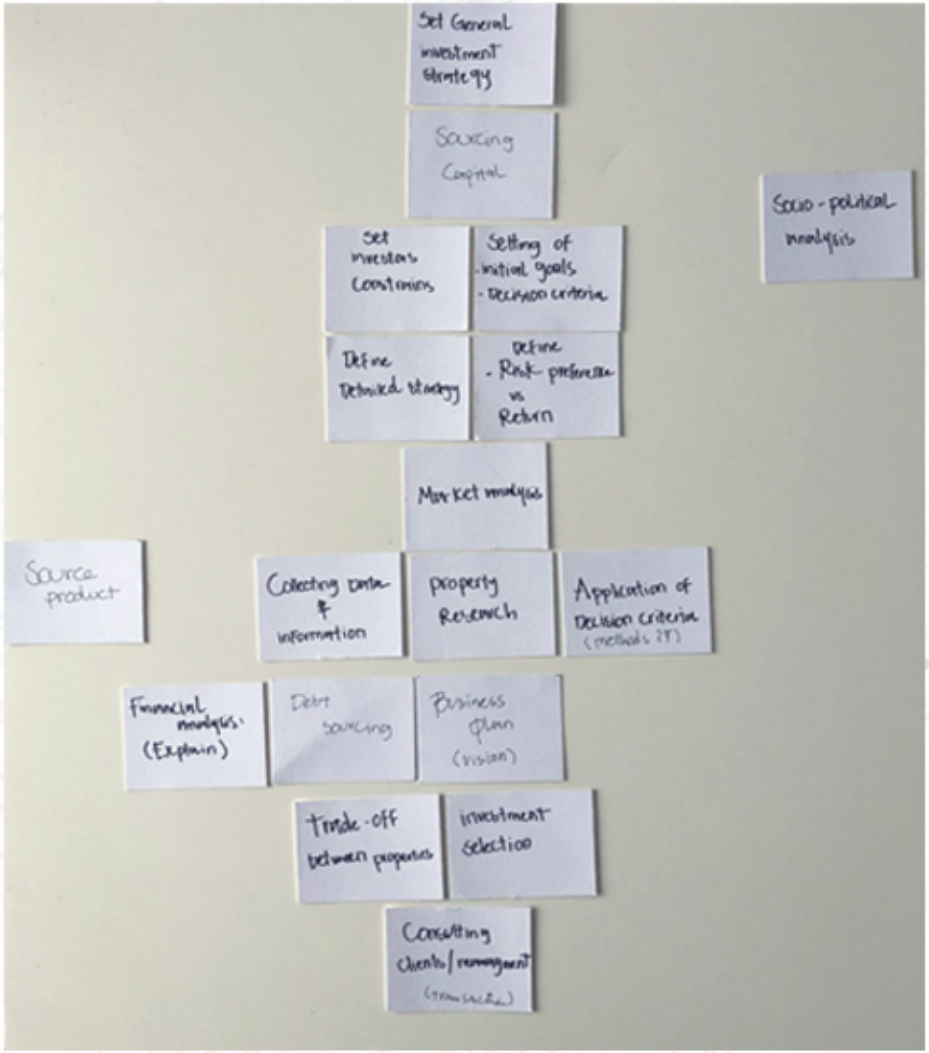
3- RESEARCH METHODOLOGY

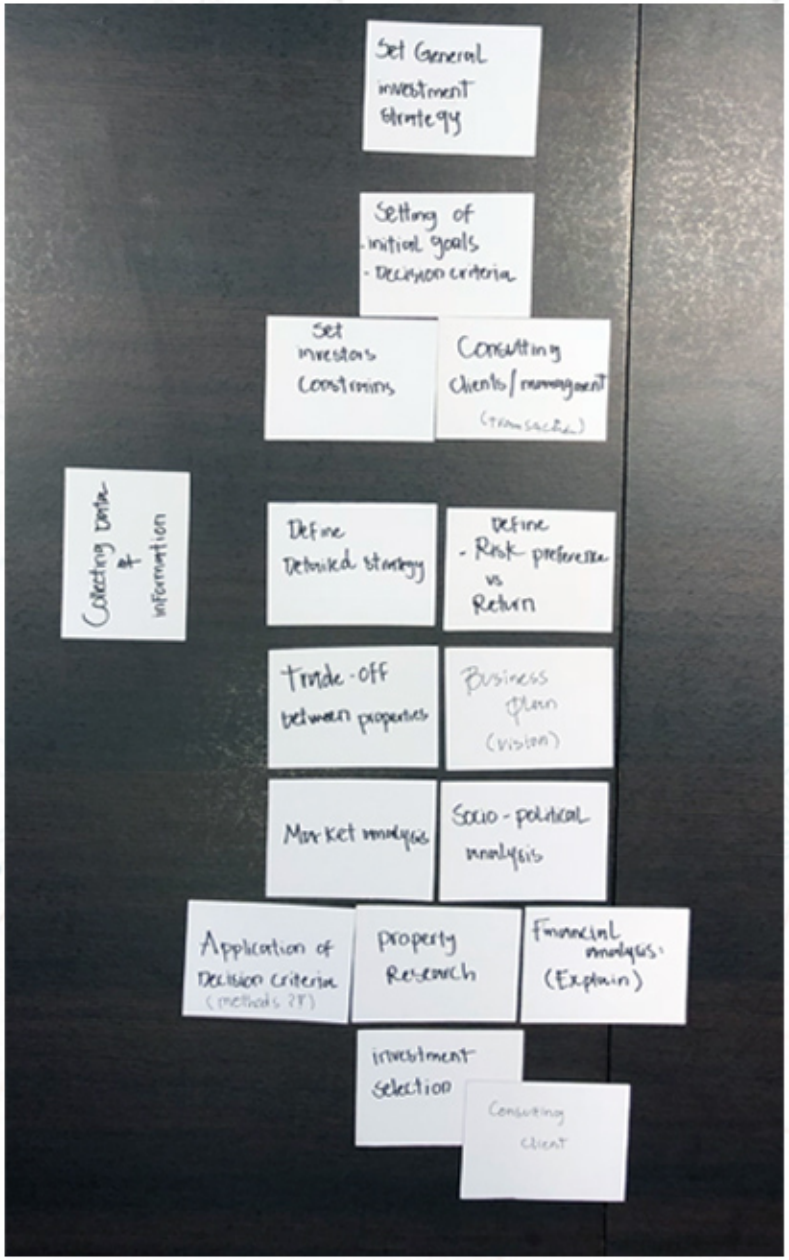
- RESEARCH SAMPLE:

PHASE ONE

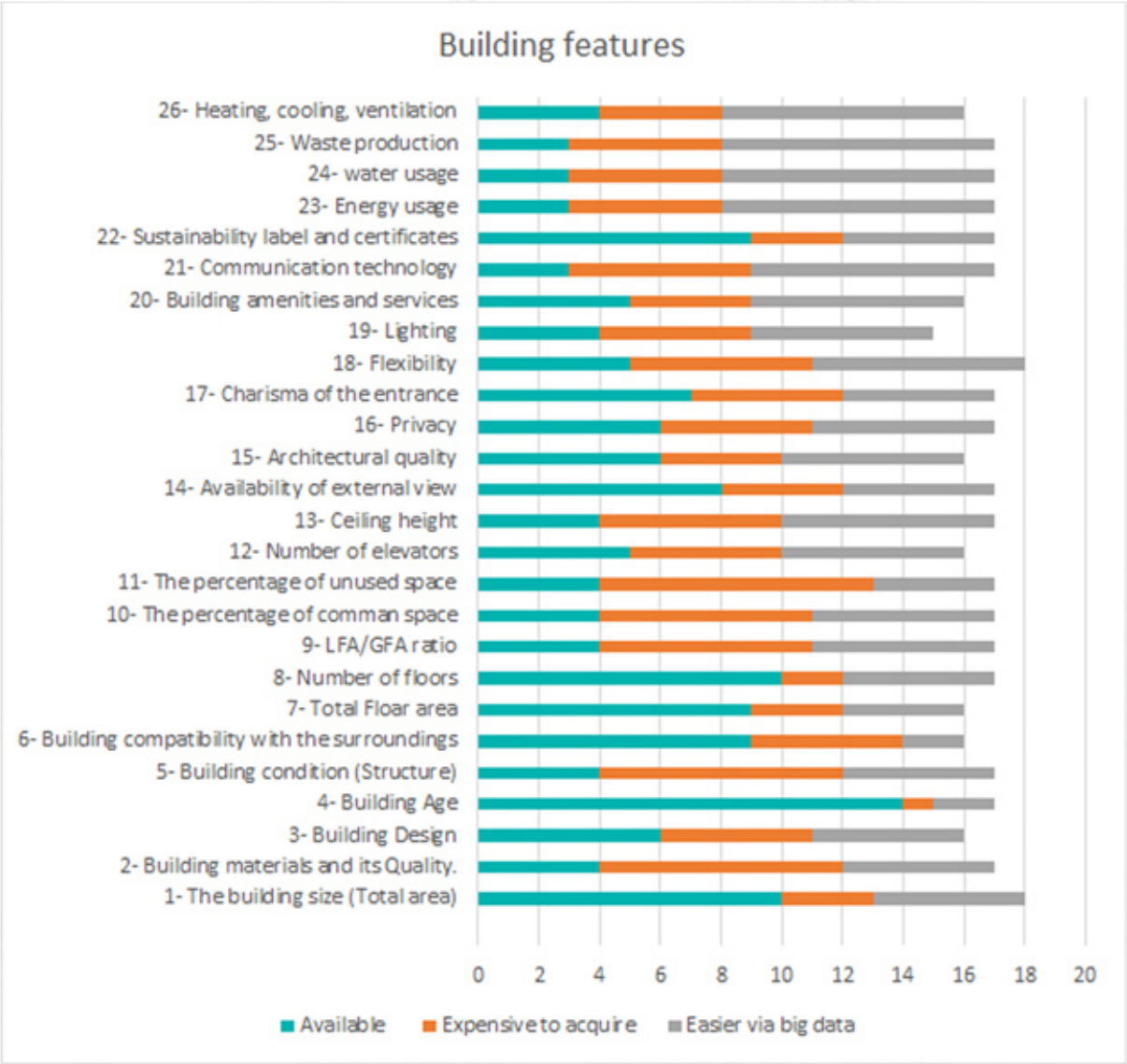
DECISION MAKING PROCESS:

Excluded steps
Additional steps
Valuation models





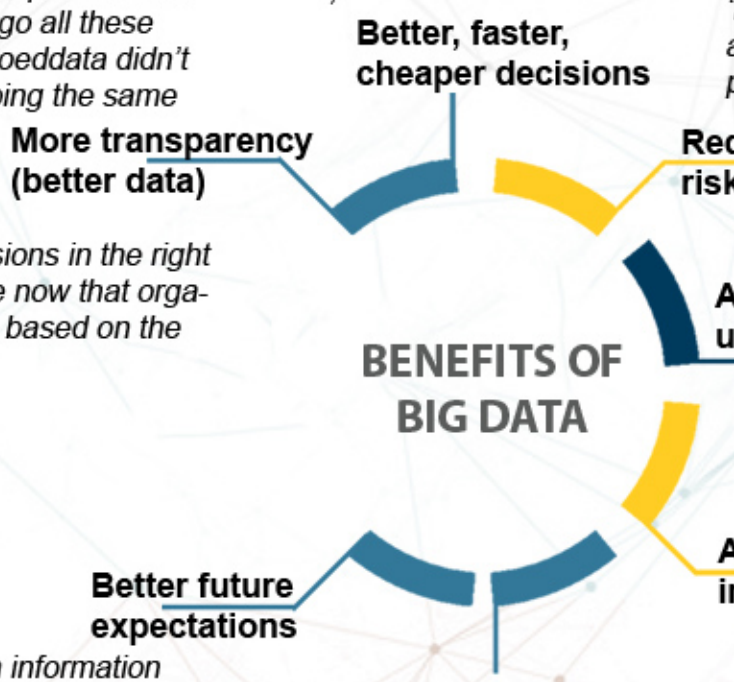
ACQUISITION INDICATORS AND THEIR AVAILABILITY:



DATA AVAILABILITY:

	Available indicators	Easier to be collected via big data analytics, smart tools or building and combining different data sets
A- Economic Features	1-GDP 2- Office employment rate 3- Annual interest rate 4- Annual depreciation rate of the building	1- Vacancy rate 2- Absorption rate (Net/Gross) 3- Office stock 4- Office supply (vacant stock)
B- Location Features	1- Distance to CBD 2- Distance to the Randstad area 3- Distance to public transportation 4- Distance to highways (road infrastructure) 5- Distance from airports 6- Parking facilities/fees	1- Charisma of the surroundings & Environmental amenities 2- Number of parking spaces
C- Building Features	1- The building size 2- Building age 3- Building compatibility with the surroundings 4- Total floor area 5- Number of floors 6- Availability of external view 7- Privacy 8- Charisma of the entrance 9- Sustainability labels and certificates	1- Building materials and its quality 2- Building design 3- Building condition (structure) 4- LFA/GFA ratio 5- The percentage of common space 6- The percentage of unused space 7- Number of elevators 8- Ceiling height 9- Architectural quality 10- Flexibility 11- Lighting 12- Building amenities and services 13- Communication technology 14- Energy usage 15- Water usage 16- Waste production 17- Heating, cooling, Ventilation 18- Building layout (Single/ multi-tenants) 19- Renovation date 20- Health
D- Contract Features		1- Contract period 2- incentives

BENEFITS OF BIG DATA :



'Big data can provide information that wouldn't be rather accessible, there would be better fit between demand and supply. Better information, better knowledge of prices, (more accurate and faster decisions)'

'I think the obvious reason is that you have better arguments to do or do not invest in a certain property, better argumented decisions,'

'It comes more transparent. We are still young and we cannot imagine the time where such things like google maps for example were not there,....10 years or 15 years ago all these platforms like Geophy or Vastgoeddata didn't even exist. I cannot imagine doing the same thing 15 years back,'

'It leads to more accurate decisions in the right moment. Because what we see now that organizations still making decisions based on the wrong assumptions.'

'You can have more accurate comparable, market insights, how tenant preference will change, (user preference), then you can adapt to that more quickly.

'.. in terms of big data you are working of large scale, which allows you also to approach new investors that you have never seen before. ....., You can approach him much quicker, because I am not going to read all the newspapers and magazines for all the countries'

'It also provides you by enough information which can be shared among people, in order to see possibilities, which are not seen right now (better future expectations). '

'I would say that the transformation into using predictive analysis and I think that is the most important part '

CHALLENGES OF BIG DATA :

Data accuracy and quality

'One of the challenges is the accuracy of data, ..., I believe this is a big challenge to get the data and information correct'

'Getting accurate data. That is not publicly available..... How you keep the quality of the data?'

Knowledge & skills of people

'To have the data, ..., Updating the data, and data quality and the knowledge and skills of people working on it, and I think the third part is security or safety of the data in combination with the privacy issues.'
'

Privacy and moral issues

'.., but it means also gathering data from the people who are in the building which is also a privacy issue'

No competition (the market will be the same)

'if big data is available so the quality of the data provided by different companies probably will be at the same level. '

Alot of money, time, resources and technology to invest

'It is not suitable for our company as it is small company and big data needs a lot of investment'

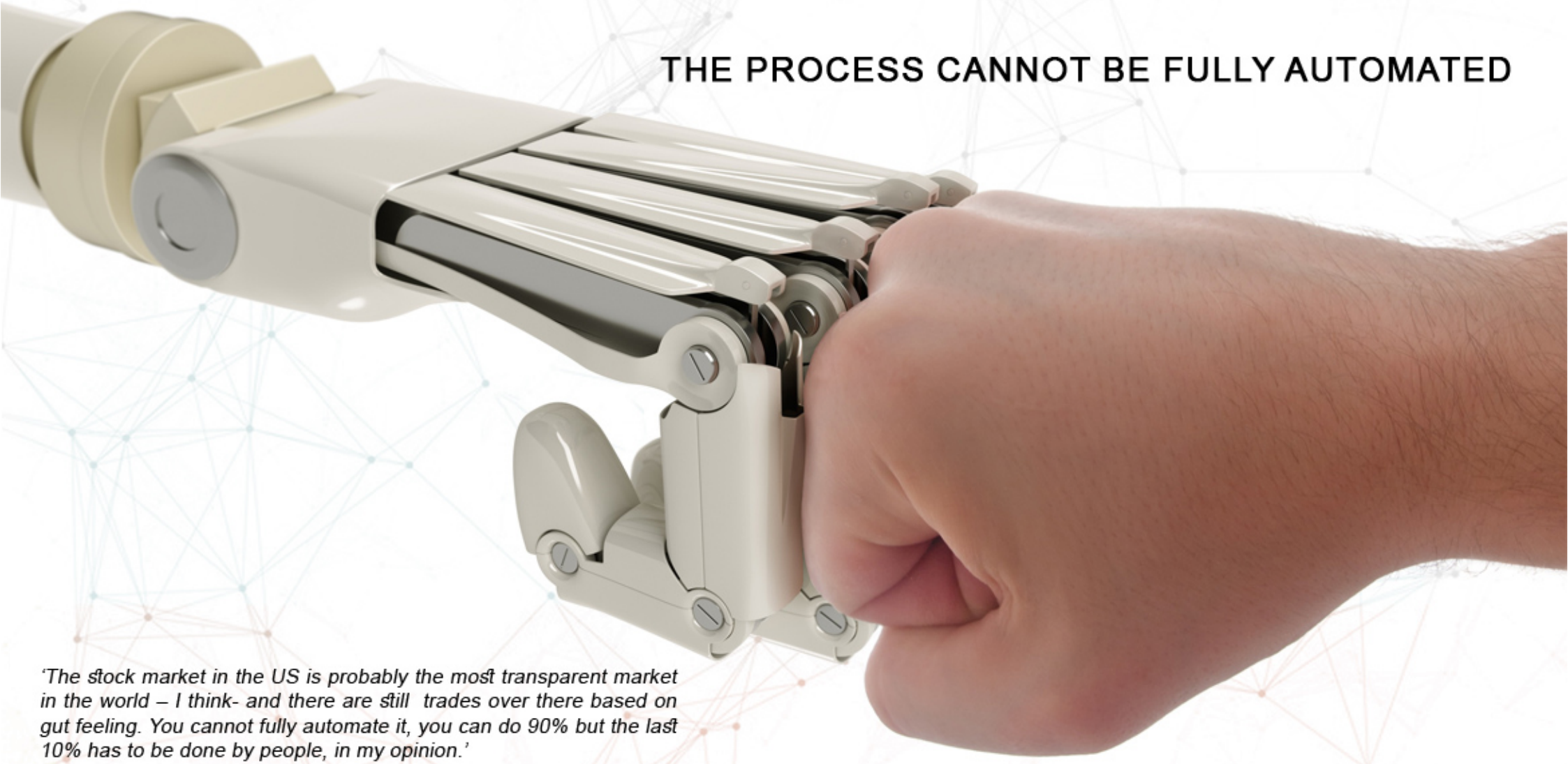
' I think what you now see 'it takes a lot of time', so you need to invest a lot of time and resources to make the information transparent and also that is what we try to do. '

Current mindset (willingness of people to share & cooperate)

'Explaining it, that is the hardest thing because it does seem to be like a black box, but getting investors onboard is actually hard and taking a lot of time '

'The willingness of all people collaborating, it is a challenge to get everyone in.'

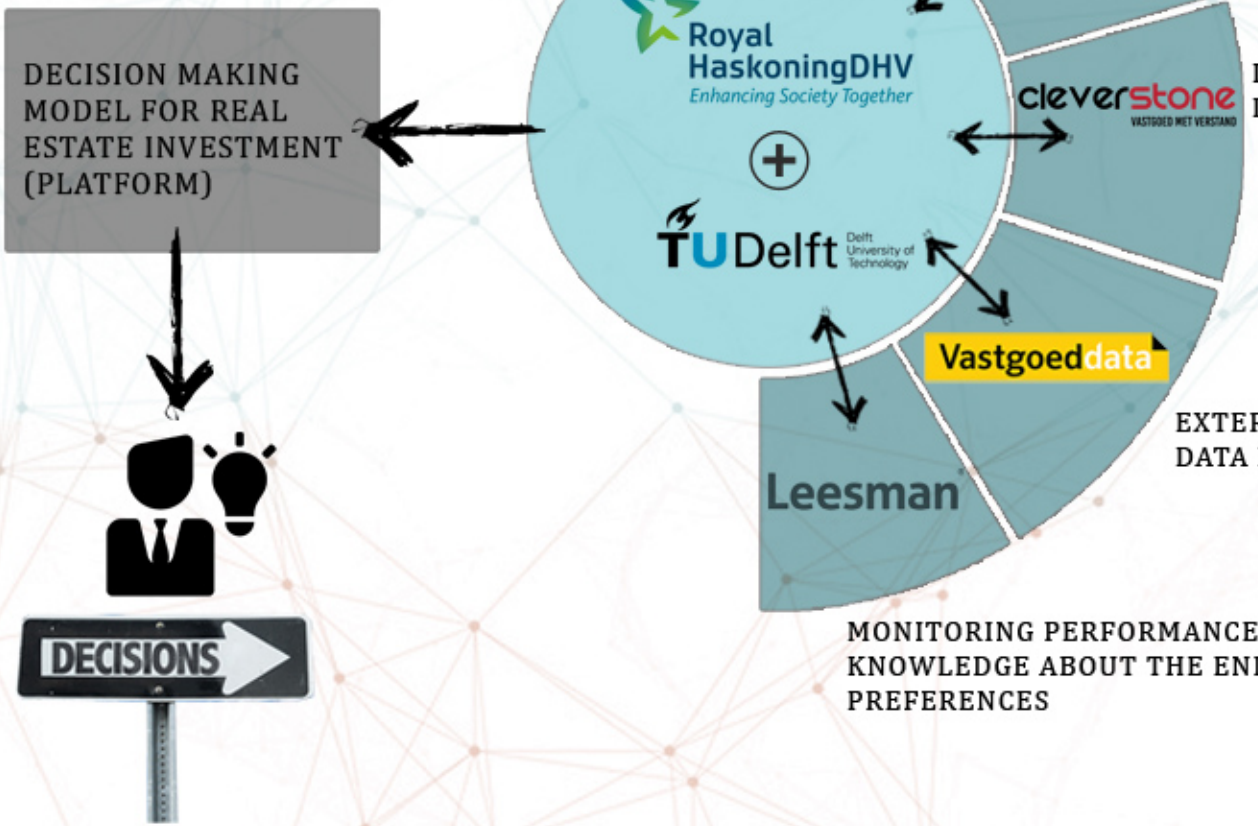
THE PROCESS CANNOT BE FULLY AUTOMATED



'The stock market in the US is probably the most transparent market in the world – I think- and there are still trades over there based on gut feeling. You cannot fully automate it, you can do 90% but the last 10% has to be done by people, in my opinion.'

'I think that gut feeling is important but we try as researchers to minimize the gut feeling ,… but I do think that estimated guess is may be 20% of the decision criteria, because it is always about the part that you cannot answer. '

CURRENT DATA FIRMS AND TOOLS :



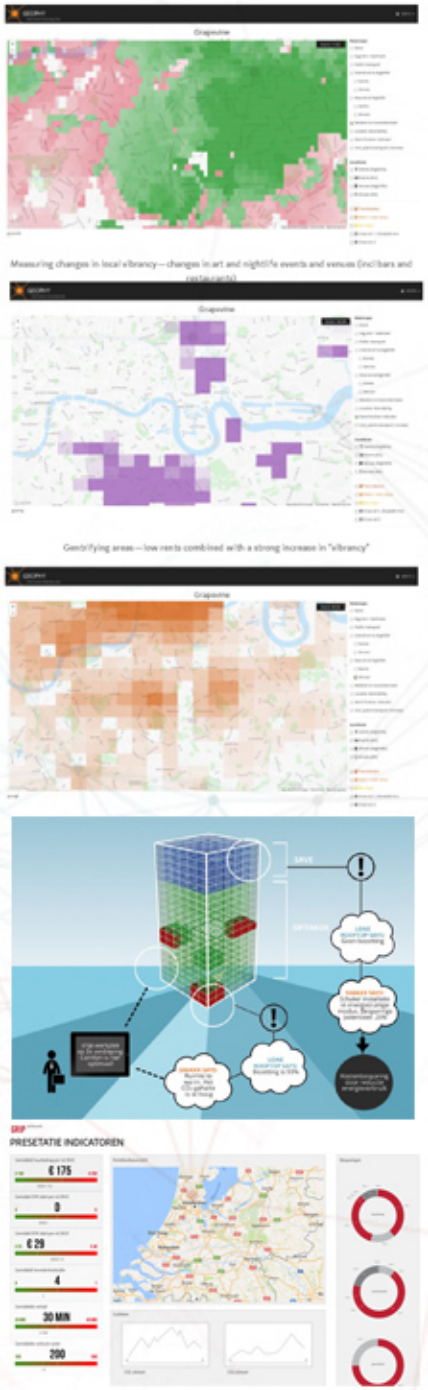
REAL ESTATE DATA PLATFORM
AUTOMATIC VALUATION
SMART LOCATION TOOL

MONITORING OCCUPANCY (LESS ENERGY COST, OPERATION COST)

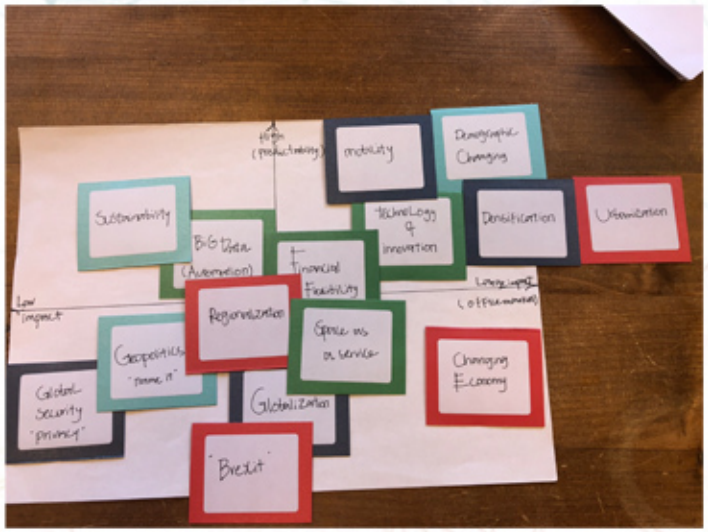
INTERNAL REAL ESTATE DATA BASE

EXTERNAL REAL ESTATE DATA BASE

MONITORING PERFORMANCE
KNOWLEDGE ABOUT THE ENDUSERS' PREFERENCES

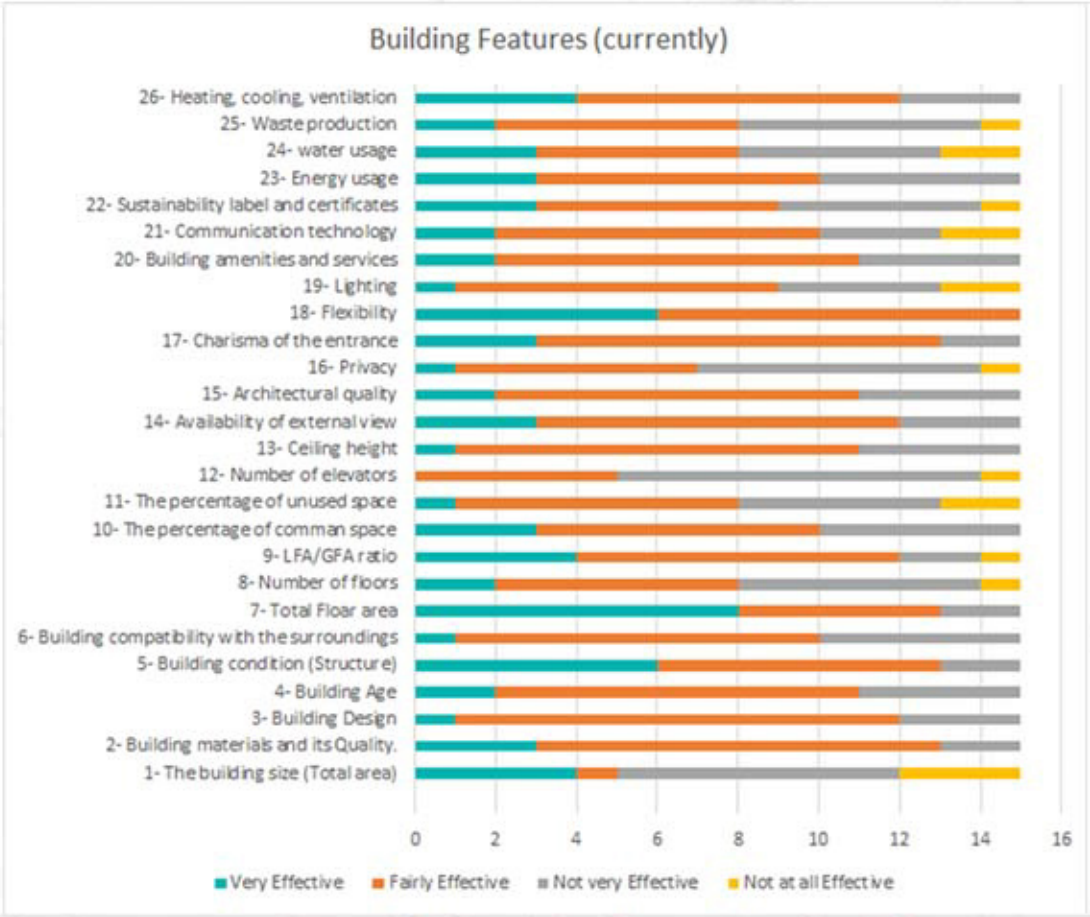


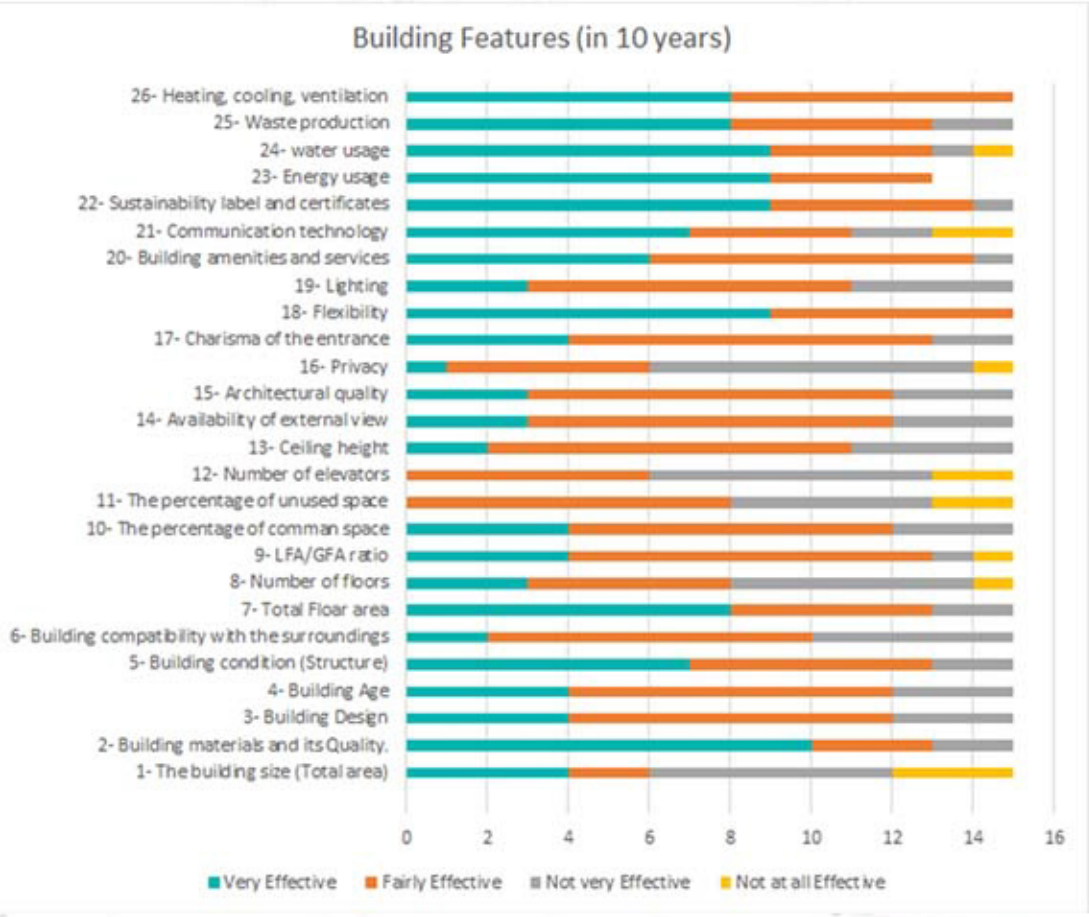
FUTURE TRENDS AND SCENARIOS :



4- RESULTS & DISCUSSION (Theme 4)

BUILDING FEATURES (IMPACT ON RENT):






Space as a Service
Space On-Demand
Coworking & Coliving

PHASE TWO

BUILDING AND VALIDATION OF THE REAL ESTATE INVESTMENT DECISION MAKING MODEL

4- RESULTS & DISCUSSION (Phase 2)

4- RESULTS & DISCUSSION (Phase 2)

REQUIRED DATA:
(based on form)

A- Quantitative data: transactional data, building data, location, contracts, economic, etc.

B- Qualitative data: location data, user preference, user satisfaction, etc.

DATA SOURCES:
(based on the collection method)

A- Internal data sources:
*Internal data bases (Api's, automatic, etc.)
*Sensors and machine generated (real-time data)
*Manual human data

B- External data sources :
*External data bases by data providers
*Social media / web.

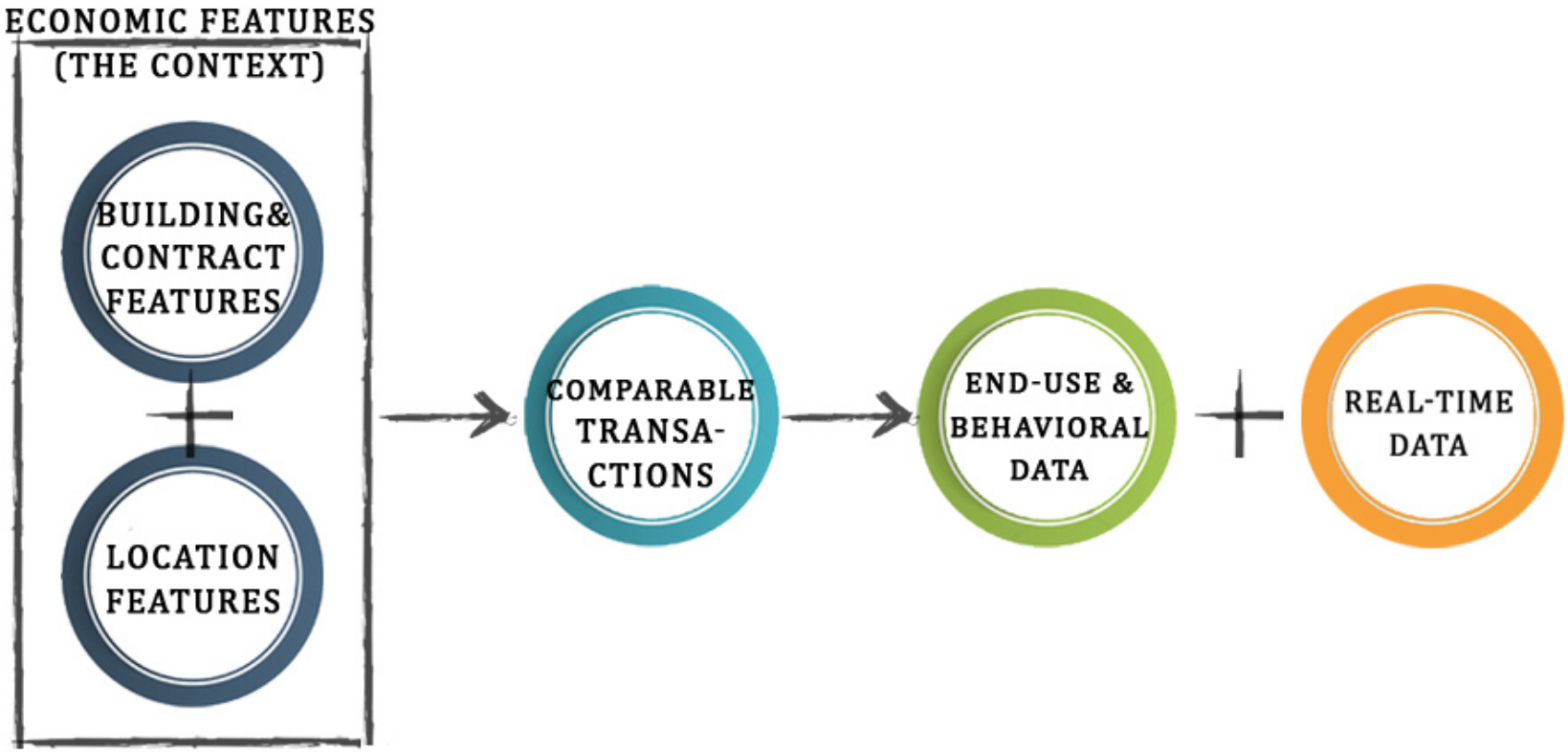
ANALYSIS TYPE:

- Descriptive & Exploratory
- Estimation
- Prediction

ANALYSIS METHODS:

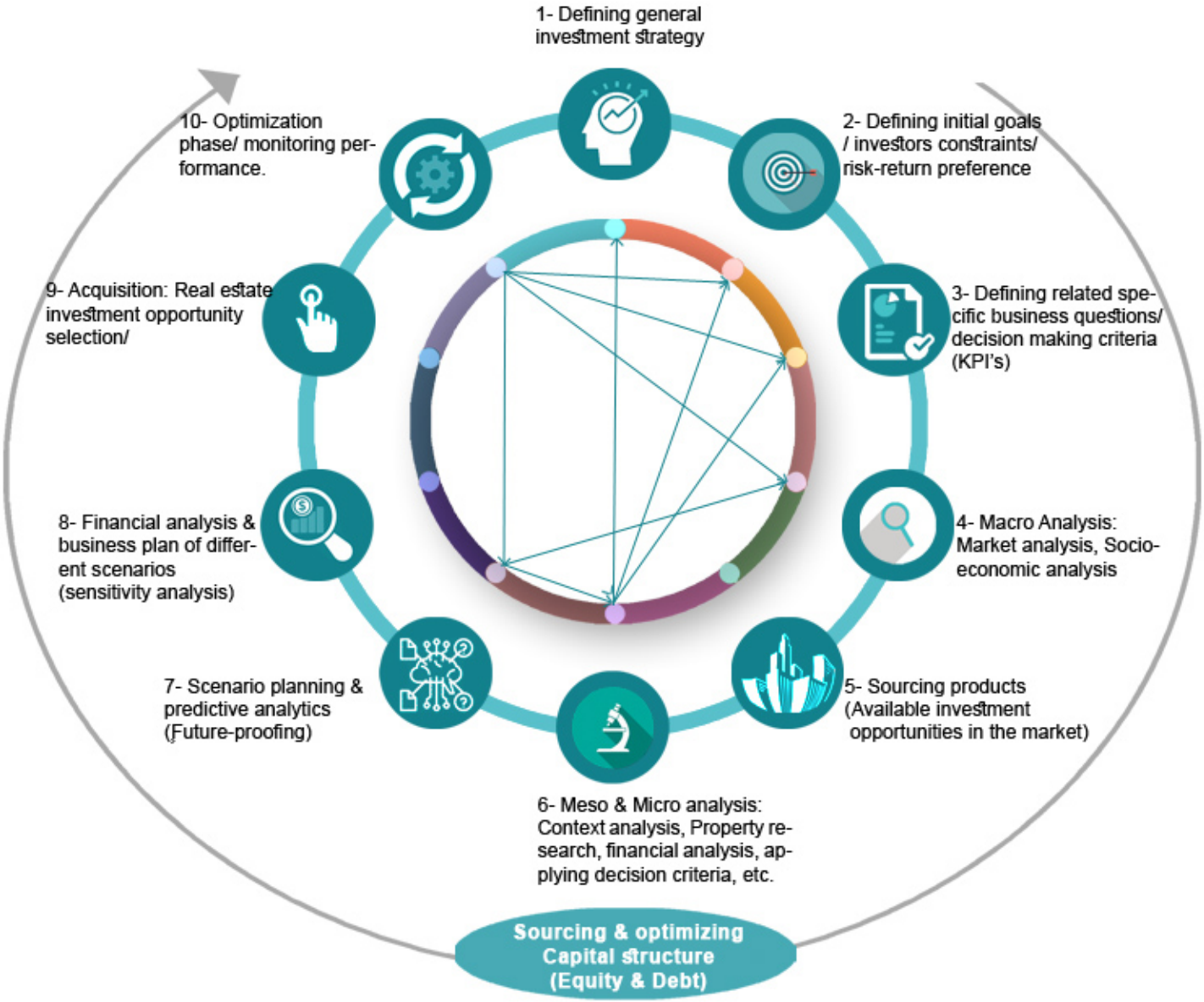
- Analytics
- Predictive analytics
- Real time analysis
- Location based analysis
- Statistical & mathematical analysis
- Social networks/web analysis
- End-user's preference and satisfaction surveys

4- RESULTS & DISCUSSION (Phase 2)

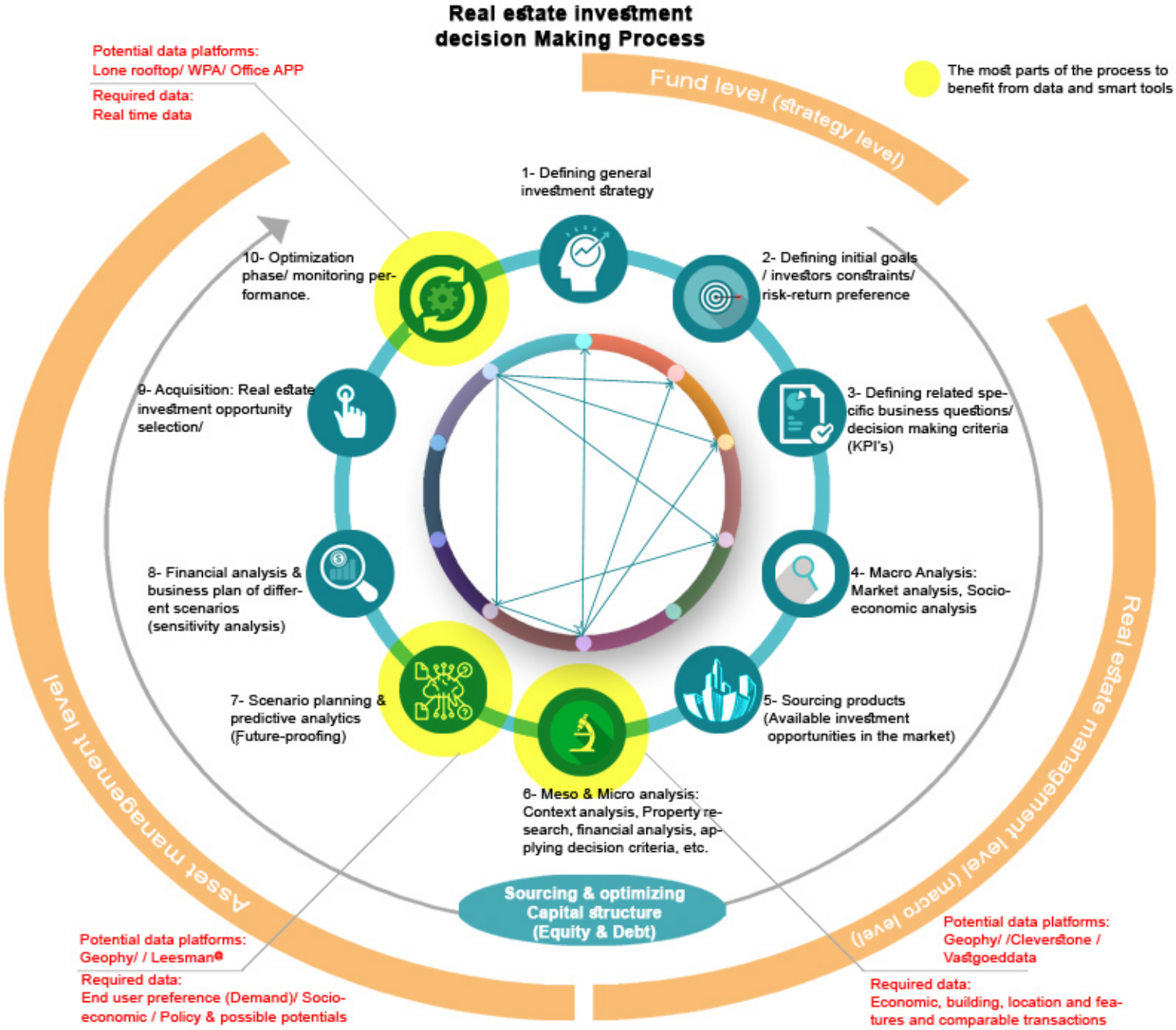


4- RESULTS & DISCUSSION (Phase 2)

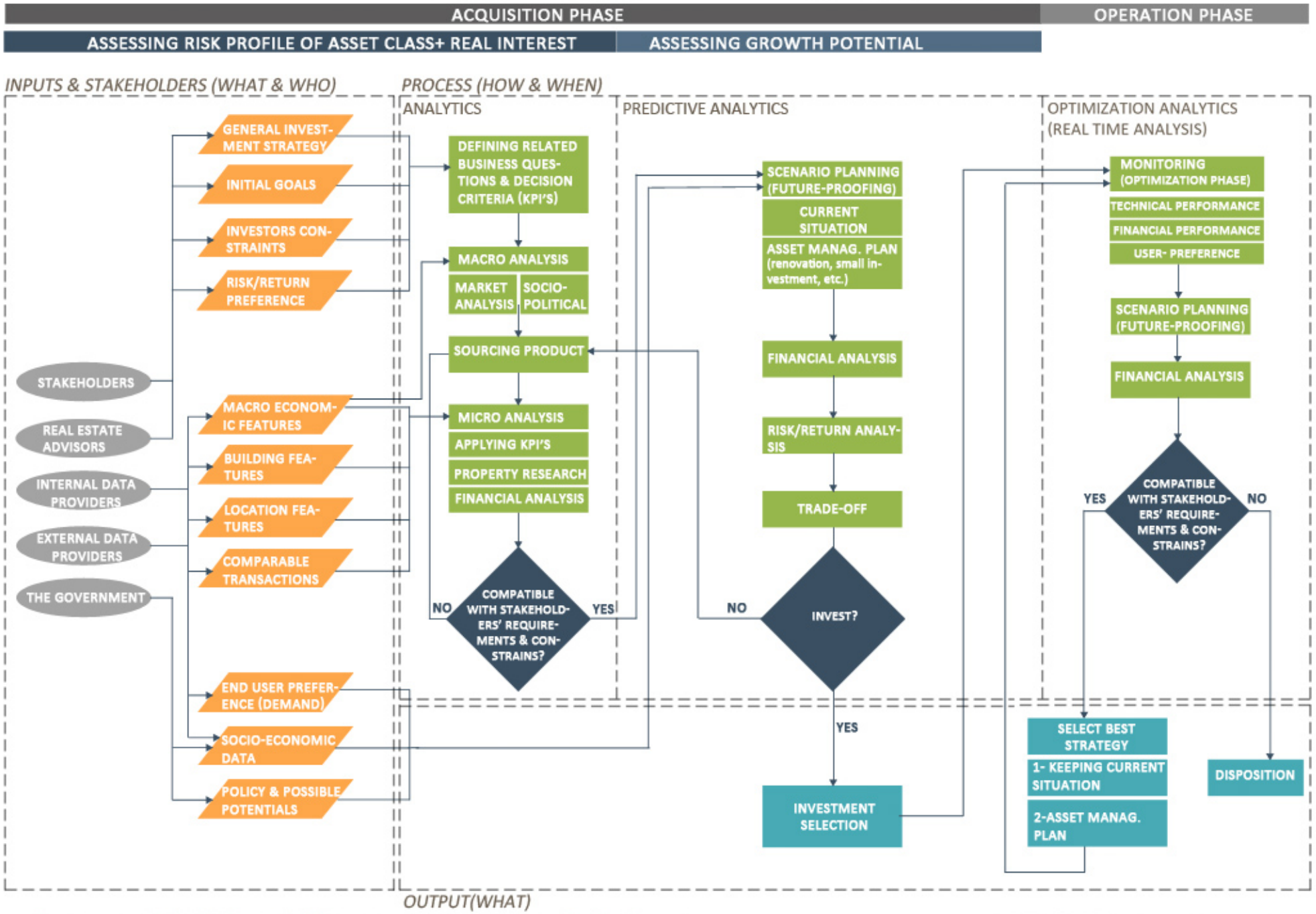
Real estate investment decision Making Process



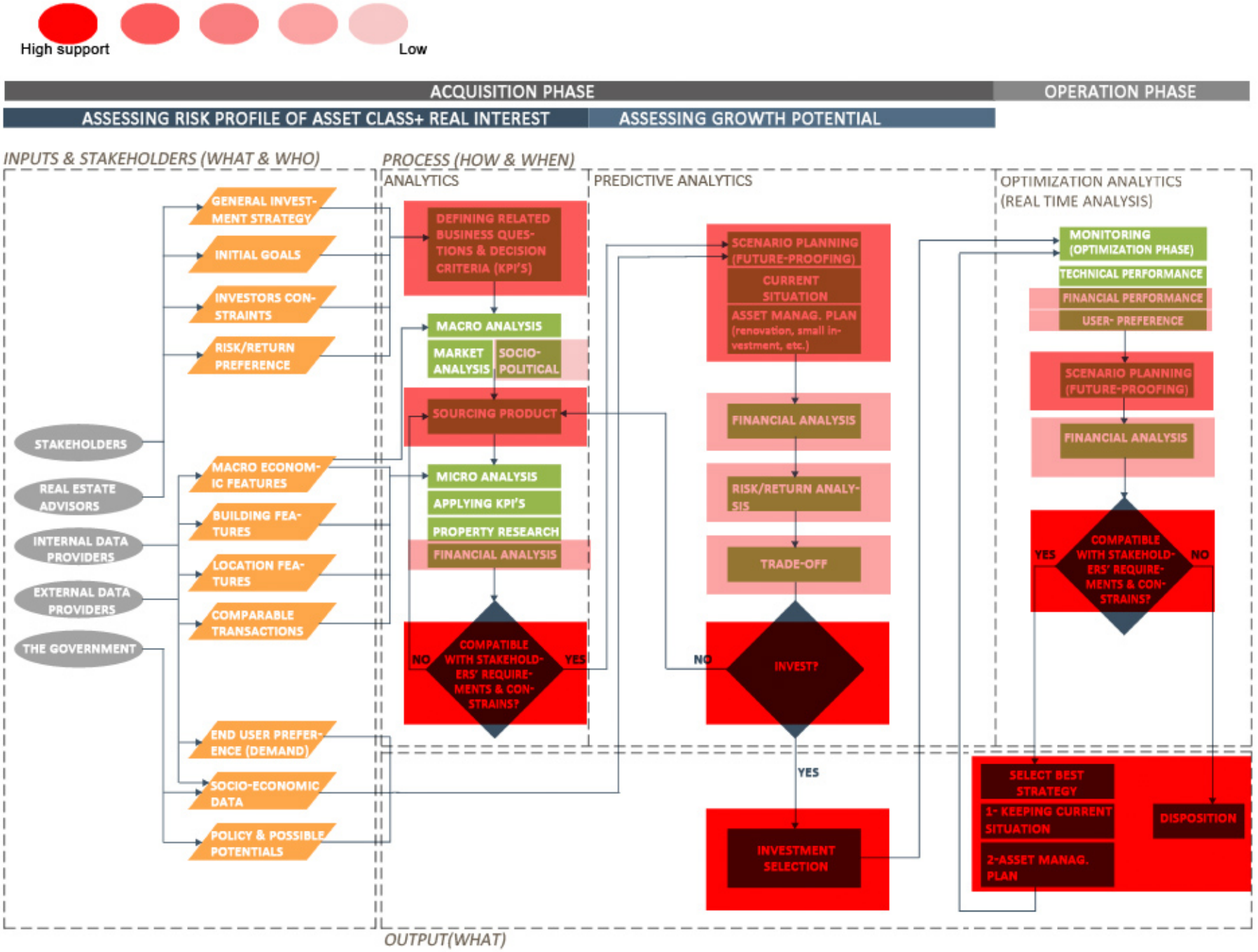
4- RESULTS & DISCUSSION (Phase 2)

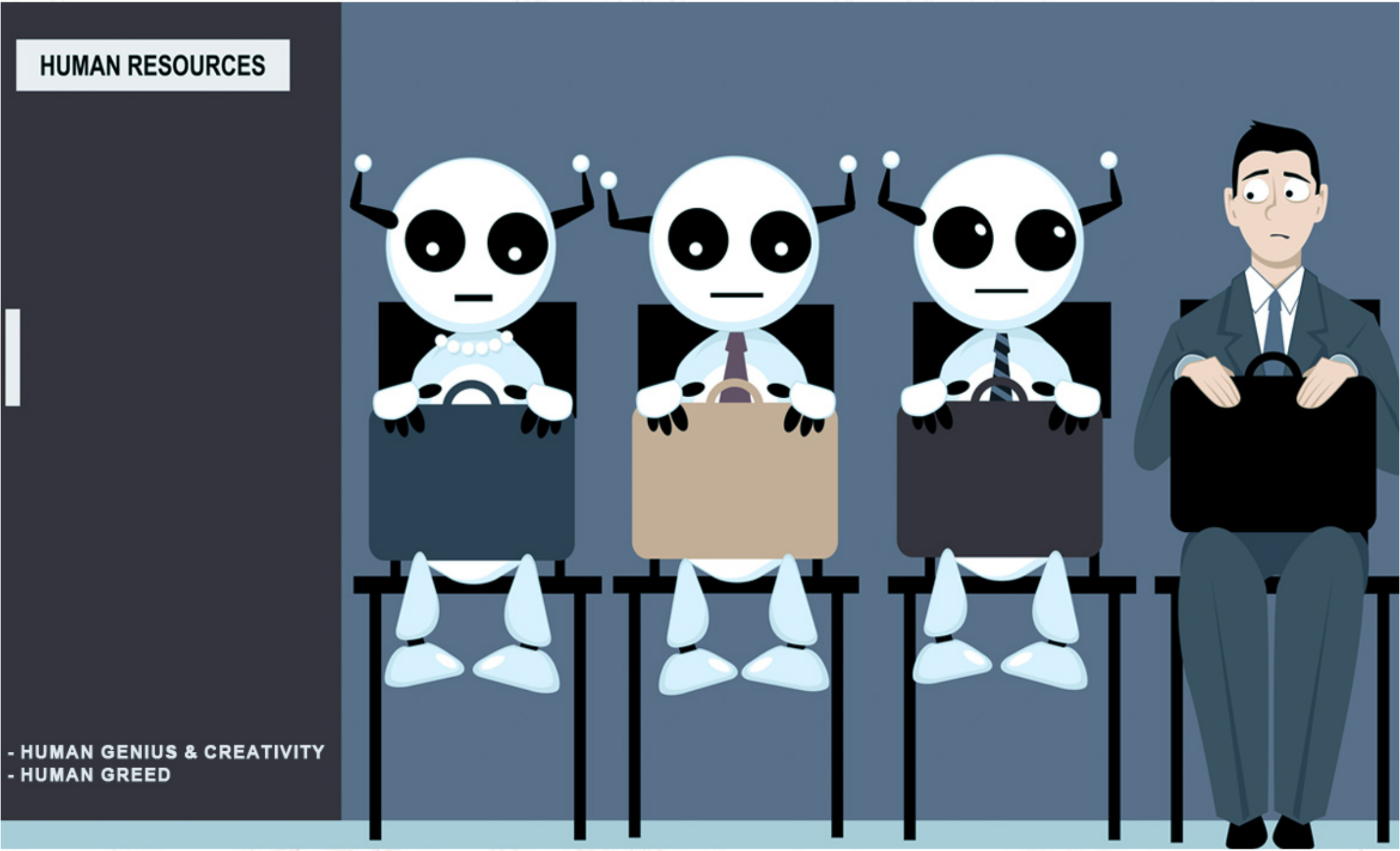


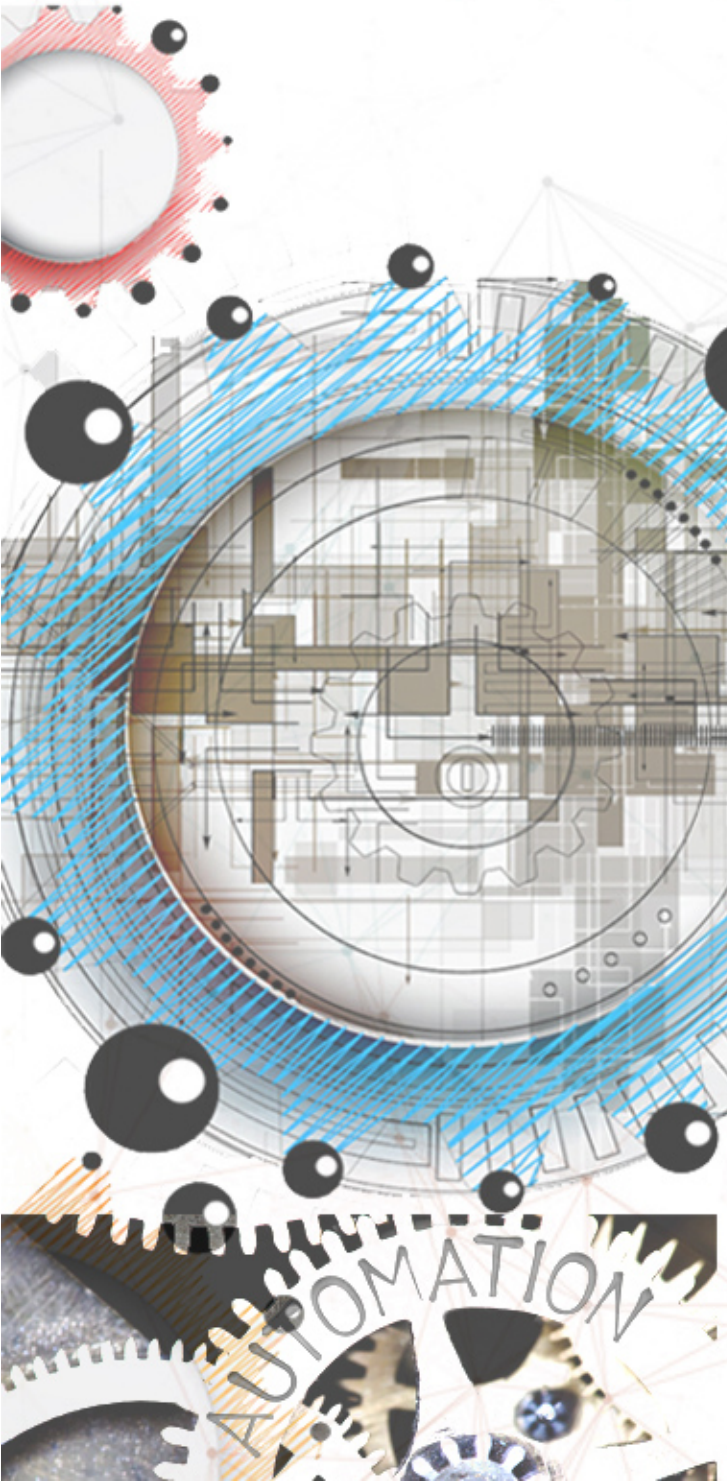
4- RESULTS & DISCUSSION (Phase 2)



4- RESULTS & DISCUSSION (Phase 2)




HUMAN RESOURCES
- HUMAN GENIUS & CREATIVITY
- HUMAN GREED



TECHNOLOGY IS MAIN DRIVER OF INCREASING THE ROLE OF HUMAN EXPERTISE AND CREATIVITY

(new ideas, products, services and opportunities)

5- CONCLUSION

The required data is not available.

Big data can improve the decision making process.

Data availability and accuracy , and the current mind set are the main challenges

- Automation and technology are the future so **prepare and adapt!**

6- REFERENCES

Acquisti, A., Brandimarte, L., & Loewenstein, G. (2015). Privacy and human behavior in the age of information. Science, 347(6221), 509-514.

Bak, R. L. (2017). A STATE OF AFFAIRS THE NETHERLANDS OFFICE MARKET (Rep.). Nieuwegein, NL: NVM Data & Research.

Colliers int. (2017). THE DUTCH REAL ESTATE MARKET 'updated August 2017' (pp. 1-51, Publication). Amsterdam : Colliers International Nederland BV . Retrieved November 12, 2017, from http://www.colliers.com/-/media/files/emea/netherlands/research/20170828_vastgoedmarkt_sectorupdate_hy1.pdf?la=en-gb

Du, D., Li, A., & Zhang, L. (2014). Survey on the Applications of Big Data in Chinese Real Estate Enterprise. Procedia Computer Science, 30, 24-33.

Leamer, E. E. (2010). Macroeconomic patterns and stories: a guide for MBAs. Berlin: Springer (Ch. 2.)

Manganelli, B. (2015). Real estate investing: Market analysis, valuation techniques, and risk management

NT, B. (2015). 30 thought-provoking Big Data quotes that you should know. Retrieved September 20, 2017, from http://bigdata-madesimple.com/30-thought-provoking-big-data-quotes-that-you-should-know/

Parker, D. (2010), REIT Investment Decision Making: A Multi Step Process?, paper presented at 16th Pacific Rim Real Estate Society Conference, available at: www.prres.net/papers/Parker_REIT_Investment_Decision_Making_Multi_step_process.pdf

Roberts, C., & Henneberry, J. (2007). Exploring office investment decision-making in different european contexts. Journal of Property Investment & Finance, 25(3), 289-305.

Schalekamp, J. (2017, September 20). HOW TO BUILD AN ANALYTICS CENTER OF EXCELLENCE. Lecture presented at Big Data Expo 2017 in Jaarbeurs Utrecht, Hal 4, Utrecht.

T.V.G. (2012). Michael Dell: Nobody Wants Big Data, Instead They Want... Retrieved December 12, 2017, from http://www.channelfutures.com/virtualization/michael-dell-nobody-wants-big-data-instead-they-want

QUESTIONS !