



# The Future of Data Entry

## Robotic Process Automation in Oracle APEX and Beyond



# Lecturer

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Founder

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# Introduction

**Sure, using Apex we can efficiently develop forms for data entry, but is all this manual data entry really necessary?**

Oracle Apex is:

„Oracle Application Express (APEX) is a low-code development platform that enables you to build scalable, secure enterprise apps, with world-class features, that can be deployed anywhere.”

- It enables us to rapidly develop complex apps with forms, reports, data validation, business logic....

# Introduction

- However, we often focus on digitalization of the whole business process except the first step – data entry
- On the other hand, sources of data are often structured:
  - Digital, structured documents
  - Spreadsheets from other departments
  - Web site data
  - Even data from other application when the integration of the two software solutions is not possible and/or is too expensive!

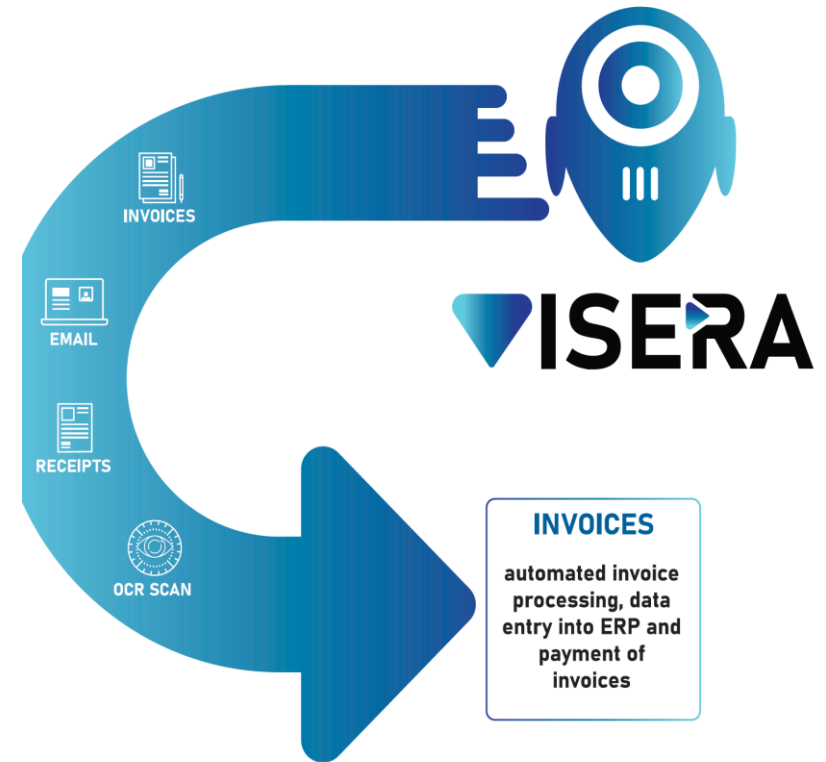
**Obviously, data entry from structured sources could be automated. So, what are the solution(s)?**

# Robotic Process Automation (RPA)

**Software for automating repetitive business processes by mimicking a human worker**

Often referred to as “software robot”

- Non-invasive technology
- Reliability and Scalability
- Cost Reduction
- Accuracy and Consistency



# RPA – Use Cases



## Business Process Automation

- Client Reporting, Payment Processing, Data Cleaning, Employee Onboarding, Underwriting, Claims Handling, Compliance Reporting



## Integration

- For integrations that are complex, expensive or too risky



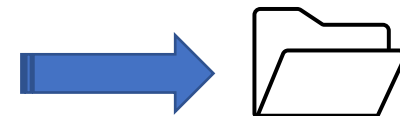
## Automated Testing

# Example: Payroll Automation

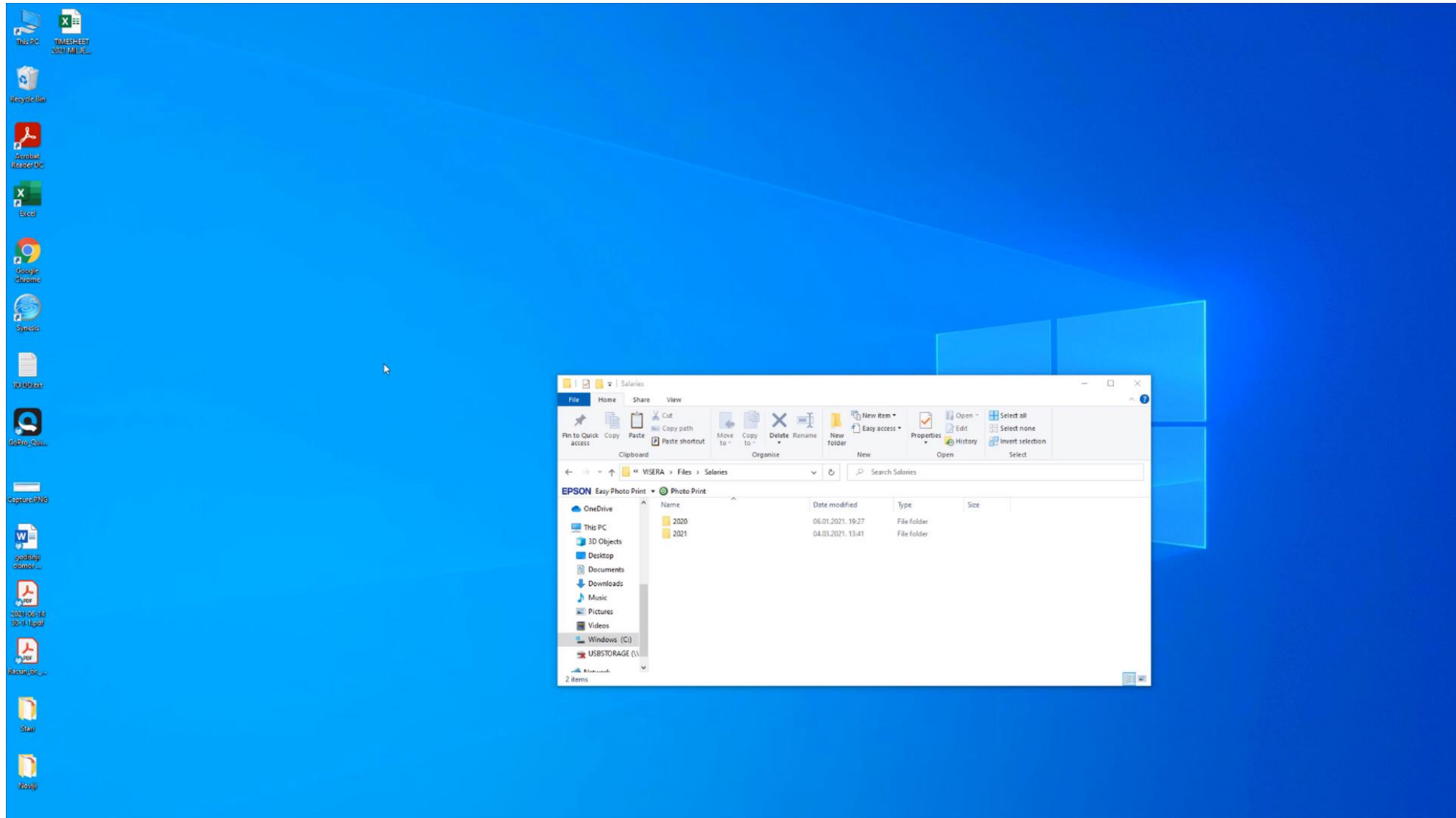
- Used to be: manual entry of hours worked for each employee into ERP, preparation of legal reports and documents, sometimes even manual payment of each net salary, tax amount, contribution....

- Now: you just drop timesheet(s) in a shared folder and robot will do all the rest

Timesheet										
1.		Employee: MILJENKO VUKOVIĆ								
2.		Year: 2021								
3.		Month: MAY								
Daily working time in hours										
Day in month	Work started (hh:mm)	Work ended (hh:mm)	Total	From that: Night Work	From that: Overtime	From that: Work on Sundays and Public Holidays	From that: hours of break in process for which worker is not responsible	Paid hours for public holidays	Field Work	Hours in Stand By
1.	8:00	16:00	8:00							
2.	8:00	16:00	8:00							
3.	8:00	16:00	8:00							
4.	8:00	16:00	8:00							
5.	8:00	16:00	8:00							
6.	8:00	16:00	8:00							
7.	8:00	16:00	8:00							
8.	8:00	16:00	8:00							
9.	8:00	16:00	8:00							
10.	8:00	16:00	8:00							
11.	8:00	16:00	8:00							
12.	8:00	16:00	8:00							
13.	8:00	16:00	8:00							



# Example: Payroll Automation





# Example: Invoices

Macrosoft d.o.o.  
Ilica 2  
10 000 Zagreb

Obračunavamo Vam kako slijedi:  
**Račun 15/1/20**

Račun

Datum računa	Šifra kupca	PDV ID. BR/OIB	Datum isporuke	Dospijeće računa
24.1.2020	658	111222334568	22.1.2020	24.2.2020

Stavke

Šifra robe	Naziv robe	J.mj.	Količina	PDV%	Cijena	Iznos
<u>1</u>	Usluge knjigovodstva		1,00	25,00	400,00	400,00
			1,00			400,00
				PDV: 25% (Osn:400,00 kn)		100,00
				<b>Ukupno kn:</b>		400,00
				Obračun prema naplaćenju naknadi		

Fiskalizacija računa

Način plaćanja	Oznaka operatera	Datum	Vrijeme
----------------	------------------	-------	---------

BIBA SPEED d.o.o.  
Ilica 1, Zagreb  
MB: 002365  
MBS: 002365455  
OIB: \_\_\_\_\_  
IBAN: HR1231231234123



# Example: Invoices

The screenshot displays a web browser window with the following elements:

- Browser Tab:** Vuković Intelligent Systems - e-računi
- Address Bar:** e-racuni.com/H2f/WOB-Qv3O2oEnwa5pnD6W3oI5JzyB-1-1.html?action=firstPage
- Browser Extensions:** Apps, YouTube, Maps, News, Gmail, How to find your W..., BI, PDS, RPA, Firma, OCR
- Application Header:**
  - Logo:** e-Računi online poslovni programi
  - User:** MILJENKO VUKOVIĆ (MILJENKO.VUKOVIC@INTELLIGENT-SYSTEMS.HR) / Vuković Intelligent Systems
  - Actions:** Reports, Settings
- Navigation Menu:** Contacts, Sales, Purchasing, Stocks, Travel expenses, Bank, Cash book, Payroll, Accounting
- Sub-Menu:** Izlazni računi, Novi račun, Ponude, Formiranje nove ponude, Putni nalozi, Novi putni nalog, Postavke maske programa
- Main Content Area:** A large, empty white rectangular area, likely a placeholder for an invoice or a list of invoices.

# How is RPA affecting the Way We Work?



**45% of all work**

activities can be automated

**\$2 trillion dollars**

could be saved in workforce spending

**6-9 Months**

on average ROI for an RPA project

**94% of CEOs**

that have incorporated RPA believe  
that it has increased the productivity








**By 2025**

25% of jobs will be robotized



# RPA Business Benefits



-  Government and regulatory compliance
-  Virtual workforce 24x7x365
-  Productivity increase
-  Reduction of human errors
-  Flexibility
-  Cost reduction
-  Scalability

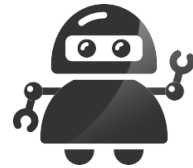


RAPID IMPLEMENTATION AND ROI  
REDUCES THE NUMBER OF FTES IN A PROCESS

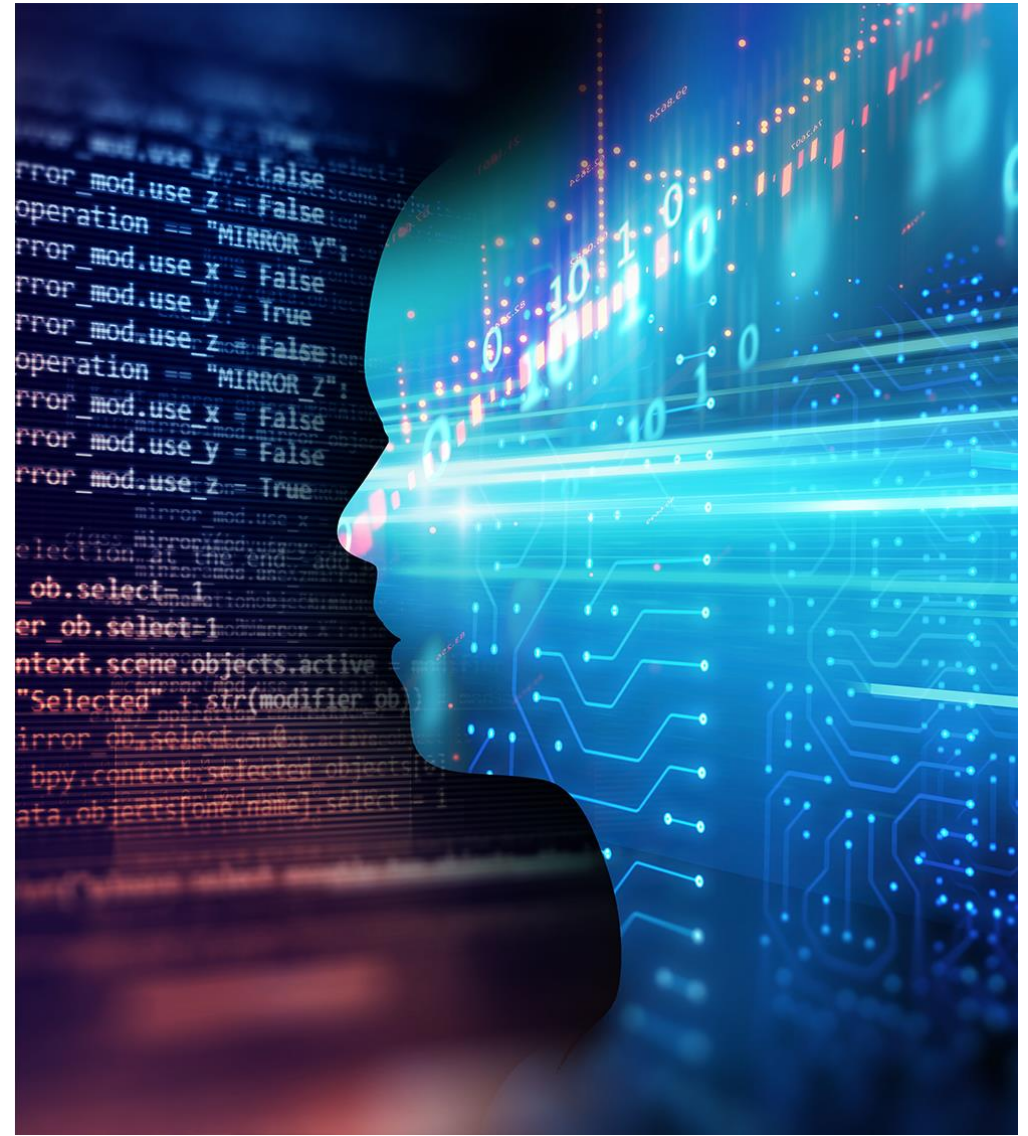
# How RPA Works?

- No significant change to the current IT infrastructure
- No changes to existing interfaces
- No need for a massive upfront investment
- Reduces swivel chair integration

Robotic Process Automation is expected to save companies **50-70% on labor costs** by making intelligent use of resources, near-zero error rates, improved compliance and reduced process cycle time, all of these through the implementation of machine learning and AI to develop/enhance procedures.



FOCUS ON ONLY JOBS HUMANS CAN DO  
**STRATEGY, CREATIVITY AND  
CONNECTING WITH PEOPLE**





# Processes Suitable for Automation



High Degree of Employee Involvement



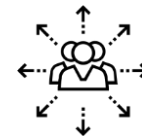
Complex, Rules Based Tasks



High Quantity / Repetition



Don't deal with unstructured data

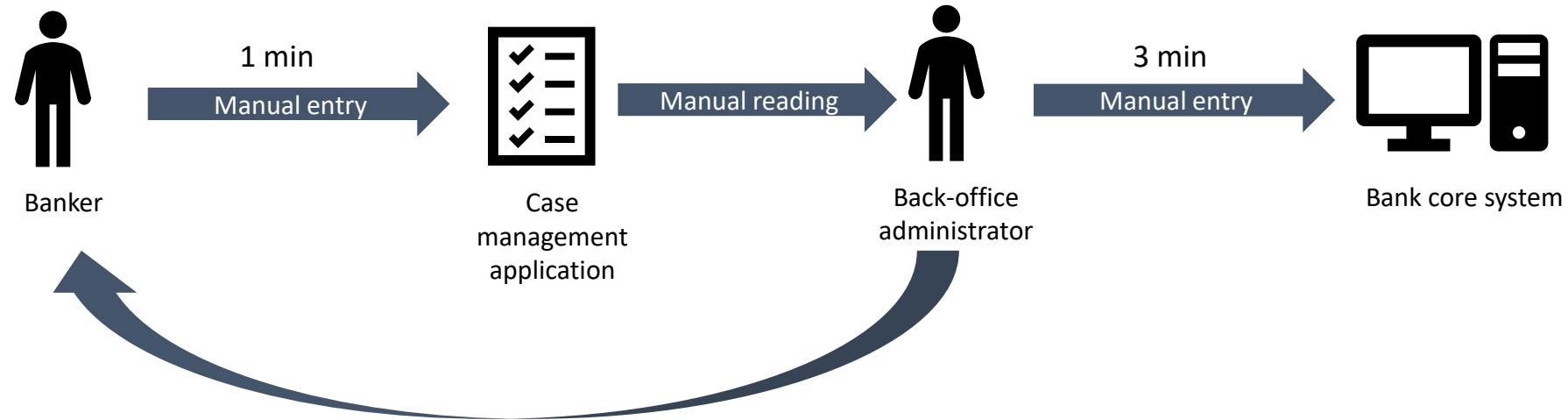


Difficulty of Outsourcing

Two important aspects:

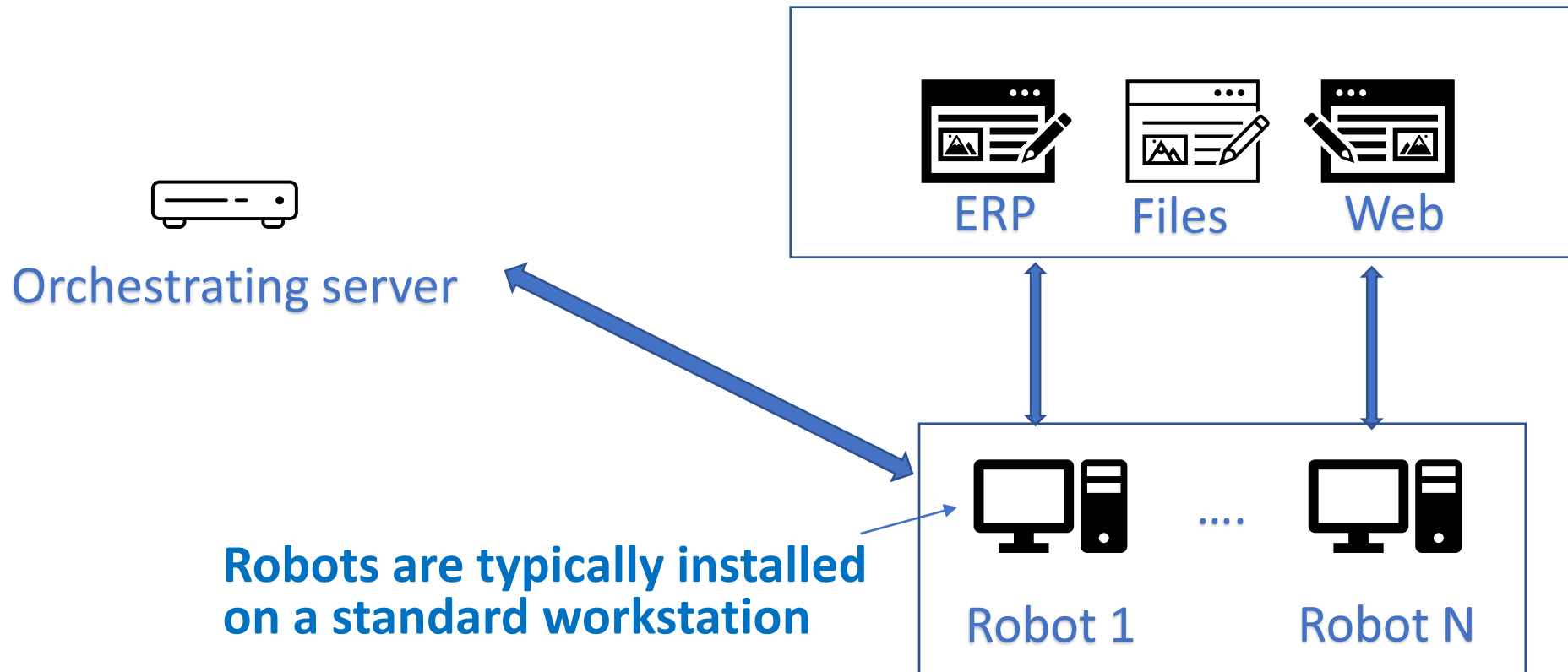
- We don't have to cover all different types of cases in the process
- We don't have to robotize the whole process

# RPA – Cost-benefit Example



- 500 entries a day:  $500 * 4\text{min} = 2000\text{min} \sim 33\text{hrs} = 4 \text{ man/days}$
- Issues:
  - Errors
  - Data quality
  - Speed
  - Employee on-boarding

# Typical RPA deployment





# Do I have to use specialized RPA platform?

- Not necessarily. Robots can be developed in any standard programming language, i.e. Python, Java, C#....
- In fact, our demo is developed in Python

# Pros of specialized RPA platforms

- Pros of RPA platforms like UiPath, MS Power Automate, Robotiq.ai, G1ANT...
  - Standardized instructions („activities”, „process steps”) for clicking, typing into fields, drop down list manipulations.... – no need to program it from the scratch
  - Many platforms are also visual, so theoretically no coding skill is necessary
  - **Orchestration!** It can get really hard to synchronize many (possibly interdependent) robots on many machines which can be scheduled, triggered, user started/assisted....

# Cons of specialized RPA platforms

- Cons:
  - Obviously, license costs
  - If you already have in house programming skills (Python, Java, C...), you will have to learn a new technology in the case of introduction of new RPA technology

# Finally, an Apex example 😊

## **USE CASE:**

- We run an association (user group? 😊 )
- We enter all the membership application forms in Apex application in order to issue invoices
- Applications are usually recieved on email, in the pdf form downloaded from our web site
- We are currently happy with the web site, but our Apex app and web are NOT integrated
- We asked the student who developed the web if the integration is possible, but in the meantime he has migrated to Australia 😊

# PDF Form example

**hroug**  
hrvatska udruga oracle korisnika

**PRIJAVA**  
Za članstvo u Hrvatskoj udruzi Oracle korisnika  
za krajnjeg korisnika - Fizičku osobu

Ime i prezime	<input type="text"/>
Ulica i kućni broj	<input type="text"/>
Poštanski broj i grad	<input type="text"/>
OIB	<input type="text"/>
Datum rođenja	<input type="text"/>
Broj mobitela	<input type="text"/>
e-mail za kontakt	<input type="text"/>
<b>U kojem poduzeću radite?</b>	<b>Ne radim</b> <input type="checkbox"/>
Naziv poduzeća	<input type="text"/>
Pozicija u poduzeću:	<input type="text"/>
Osnovna djelatnost vašeg poduzeća	<input type="text"/>
Koliko imate stalno zaposlenih u IT	<input type="text"/>
Želimo primati HrOUG Novosti	<input type="checkbox"/> DA <input type="checkbox"/> NE

Molimo vas da Ispunjenu i ovjerenu prijavnicu pošaljete **poštom** na adresu: HrOUG, Ulica hrvatskih branitelja 3, 10430 Samobor, **telefaxom** na broj +385 1 440 00 98 ili **e-mailom** na info@hroug.hr

Hrvatska udruga Oracle korisnika će temeljem vaše prijave za članstvo na vašu adresu poslati **račun R1** za članarinu.

Članarina u HrOUG-u **vrijedi za kalendarsku godinu** u kojoj je uplaćena.


<b>Datum</b>	<b>Potpis</b>
<input type="text"/>	<input type="text"/>

# Database table

APPLICATION_FORM		
ID	INT	(PK)
NAME	VARCHAR2(40)	
SURNAME	VARCHAR2(40)	
ADDRESS	VARCHAR2(40)	
CITY	VARCHAR2(40)	
POSTAL_CODE	VARCHAR2(10)	
PERSONAL_TAX_NUMBER	VARCHAR2(40)	
DATE_OF_BIRTH	DATE	
MOBILE_PHONE_NO	VARCHAR2(40)	
EMAIL_ADDRESS	VARCHAR2(40)	
EMPLOYED_Y_N	CHAR(1)	
COMPANY_NAME	VARCHAR2(40)	
POSITION_IN_COMPANY	VARCHAR2(40)	
COMPANY_CORE_BUSINESS	VARCHAR2(40)	
COMPANY_NO_OF_EMPLOYEES	INT	

# Apex form

The screenshot shows a web browser window displaying an Apex form. The browser's address bar shows the URL: 127.0.0.1:8080/apex/f?p=101:15:8051255791649::NO:15::&cs=3OZ1sxaND0joTV3bqTQgdJAwEw. The page title is "APEX DEMO APPLICATION - VIS 2022". The form is titled "Editing Person's Information" and includes a "Cancel" button and an "Add new" button. The form fields are as follows:

Firstname *	<input type="text"/>
Lastname *	<input type="text"/>
Address *	<input type="text"/>
City *	<input type="text"/>
Postal Code *	<input type="text"/>
Personal Tax Number *	<input type="text"/>
Date Of Birth *	<input type="text"/> 
Mobile Phone No *	<input type="text"/>
Email Address *	<input type="text"/>
Is Employed *	<input type="radio"/> Y <input type="radio"/> N
Company Name	<input type="text"/>
Company Core Business	<input type="text"/>
Company No Of Employees	<input type="text"/>

Created for demo purpose @2022

# Our current problems

- PDF applications sometimes get lost in the mailbox and never entered, resulting in lost revenue
- Lot of typos in applicants' names and contact data
- Typos result in members' complaints
- Embarrassing situations on the conferences



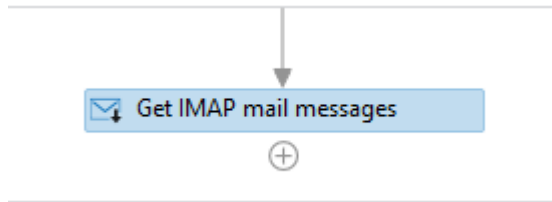
# Possible solutions

1. Complete redesign of the Web site in order to integrate it with database

OR

2. Development of a simple software robot to automate current business process

# Robot development – check email for pdf-s

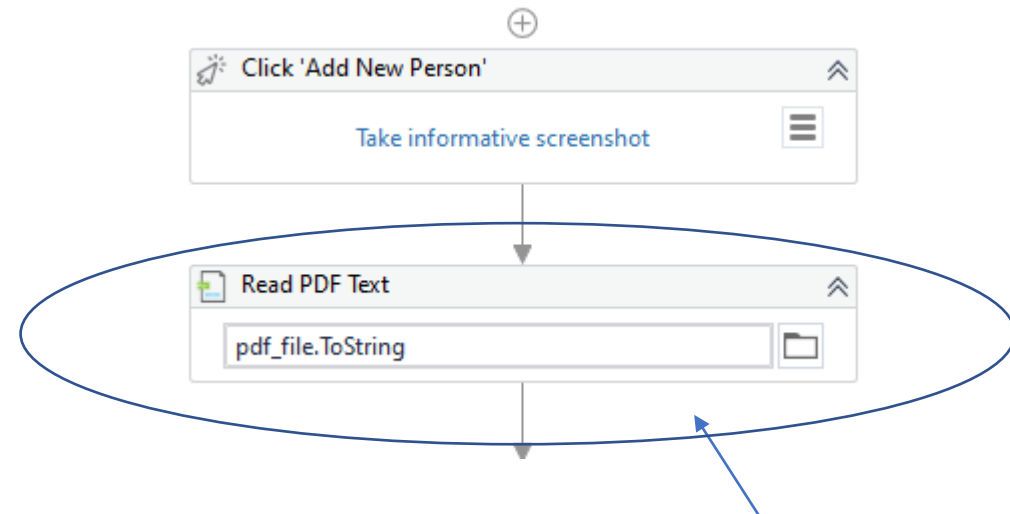


<b>Common</b>	
DisplayName	Get IMAP mail messages
TimeoutMS	<i>Specifies the amount of time (i...</i>
<b>Host</b>	
MailFolder	"Inbox" ...
Port	993 ...
Server	serverXml ...
<b>Logon</b>	
Email	EEmailAttachment ...
Password	EEmailAttachmentPassword ...
<b>Misc</b>	
Private	<input type="checkbox"/>
<b>Options</b>	
DeleteMessages	<input type="checkbox"/>
MarkAsRead	<input checked="" type="checkbox"/>
OnlyUnreadMessages	<input checked="" type="checkbox"/>
SecureConnection	Auto
Top	10 ...
<b>Output</b>	
MailMessages	getMailMessages ...

# Robot development – reading the pdf file

```
for filename in [f for f in filenames if '.pdf' in str(f)]:  
    filename = str(os.path.join(dirpath, filename))  
    filename_direct.append(filename)
```

**Python example**



**Specialized RPA platform**

# Robot development – parsing data from text

The image shows a workflow editor window titled "\_Assign\_" with a vertical sequence of steps:

- Assign: Firstname = Split(Split(output\_t...
- Assign: Lastname = S...
- Assign: Address = S...
- Assign: Postal\_code = System.Text.Reguli...
- Private: Assign: City = Split(Split(output\_t...
- Assign: Personal\_tax\_no = Split(Split(output\_t...
- Date Of Birth (2 action(s), Double click to View)
- Assign: Mobile = Split(Split(output\_t...

An "Expression Editor" dialog box is open over the "Lastname" step. It contains the following text:

```
Value (String)  
1 Split(Split(output_text.ToString, "lme i prezime ")(1), " ")(0).toString.replace(vbCrLf, "").trim
```

The dialog box has "OK" and "Cancel" buttons at the bottom right.

# Robot development – entering data in Apex

The image displays a robot development tool interface with a workflow for entering data into an Apex application. The workflow is titled "Attach Window 'New Person'" and is set to "Target is window". It consists of several steps:

- Do** (Container)
- Type Into 'INPUT\_P15\_FIRSTNAME'** (Step): Includes a "Take informative screenshot" button and a dropdown menu with "Firstname.ToString".
- Type Into 'INPUT\_P15\_LASTNAME'** (Step): Includes a "Take informative screenshot" button and a dropdown menu with "Lastname.ToString".
- Type Into 'INPUT\_P15\_ADD'** (Step): Includes a "Double-click to view" button.
- Type Into 'INPUT\_P15\_CITY'** (Step): Includes a "Double-click to view" button.
- Type Into 'INPUT\_P15\_POS'** (Step): Includes a "Double-click to view" button.
- Type Into 'INPUT\_P15\_PERS'** (Step): Includes a "Double-click to view" button.

A "Selector Editor" window is open, showing the selected element's attributes and selector code:

**Selector Editor**

Buttons:  Validate,  Indicate Element,  Repair,  Highlight

**Edit Attributes**

- app chrome.exe
- title 127.0.0.1:8080/apex/\*
- id P15\_LASTNAME
- type text

**Edit Selector**

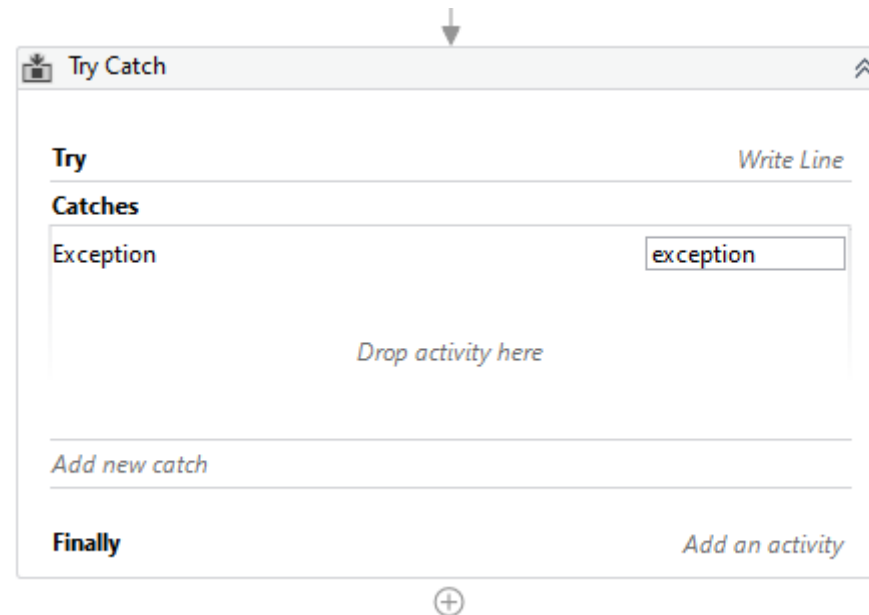
```
<html app='chrome.exe' title='127.0.0.1:8080/apex/*' />  
<webctrl id='P15_LASTNAME' tag='INPUT' type='text' />
```

Buttons: OK, Cancel

# Robot development – why not directly to DB?

- Technically, sure it is possible
- Data validation – we don't want to reproduce it and then **maintain** in the robot the same logic already developed in Apex

# Robot development – error handling



# Can we see a demo?

NO!

Live demos can crash!

Powerpoint never (??) crashes! 😊

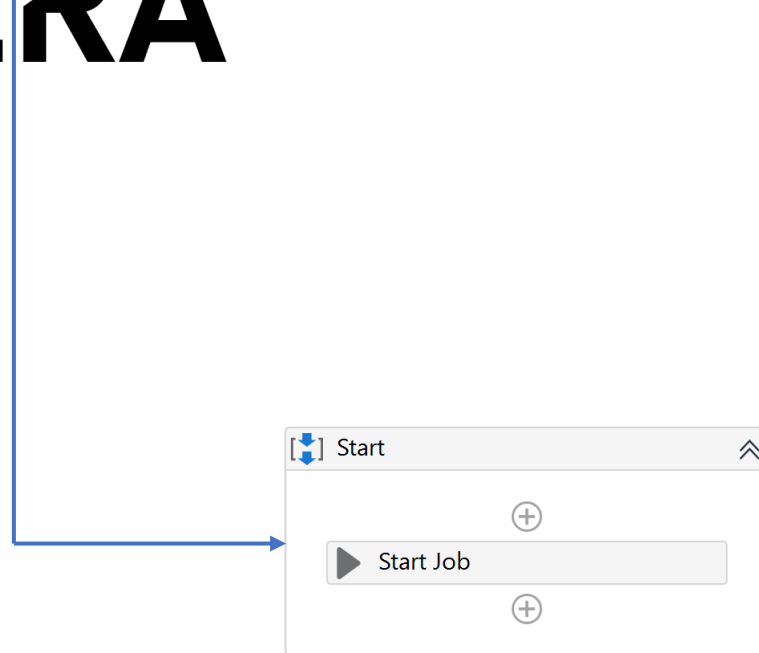


No really. Show us demo.

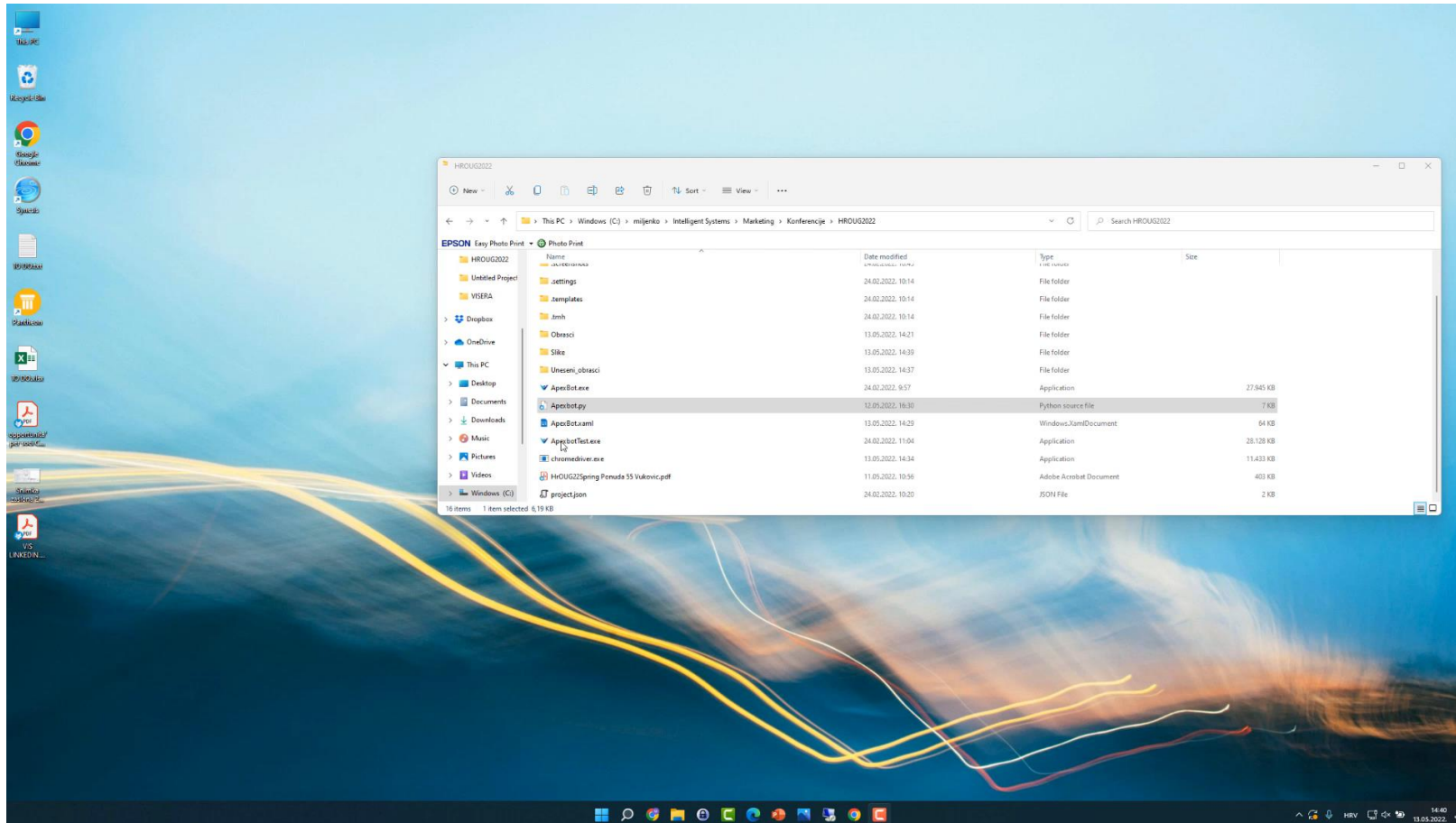
OK.

But I have a video just in case. 😊

# Short demo



# Demo - video



# RPA Implementation Phases

1. Quick Process Scan
2. Pilot Project
3. RPA Roadmap Development
4. RPA Project
5. Upgrades & Maintenance



# RPA Process Selection



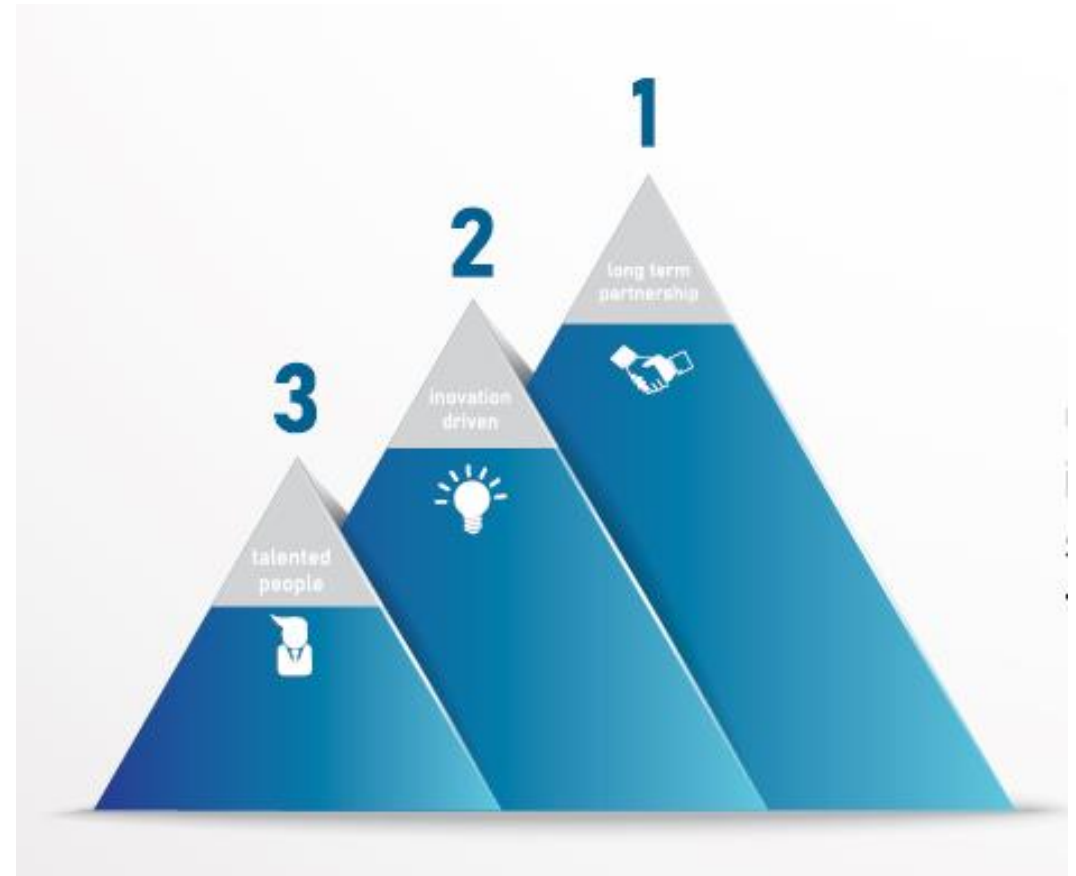
- Rule Based Process
- Currently Requires Significant Workload and / or...
- ...the Frequency and Cost of Human Errors is significant
- Changes in the Process are Relatively Rare
- Etc.

# RPA Process Estimation

	Simple complexity	Medium complexity	High complexity
Description	<ul style="list-style-type: none"><li>• ~10-20 process steps</li><li>• Simple validations and rules</li><li>• Up to 2 systems involved</li></ul>	<ul style="list-style-type: none"><li>• ~25-40 process steps</li><li>• Some validations and simple/ few exceptions</li><li>• 3-5 systems involved</li></ul>	<ul style="list-style-type: none"><li>• ~45-60 process steps</li><li>• Complex validations and multiple exceptions</li><li>• 5-7 systems involved</li></ul>
Duration	5-10 days	10-30 days	20-40 days

# Some Good Practices

1. Avoid „Big Bang” Approach
2. Each Process Has Only One „Owner”
3. Hand Over of Robots to Customer



# RPA Pricing Models - Services

1. Fixed Price
2. Time and Material
3. Hybrid Model



- It is possible to pay in installments to ensure project's immediate positive cash flow (in cases when monthly saving exceeds monthly installment)



# Packaged RPA solutions

- I don't want to develop robots from scratch for standardized processes (ie. accounting). Are there any packaged RPA solutions already on the market?
- Sure there are. For example our own solution, VISERA.

# VISERA – Robotic Accounting Automation

- Software which automates data entry for core accounting processes



# VISERA - Modules



- Invoice Entry – Payable and Receivable
- Payroll Automation
- Bank Statements Entry and Reconciliations
- Digital Payment Order Generation for Invoices and Salaries

# VISERA Invoice Processing

- „Zonal OCR” – software knows where to find a piece of data and in which format it will be
- Software recognizes a vendor via its tax number and uses vendor’s specific invoice format

## ZAGREBAČKI INOVACIJSKI CENTAR D.O.O.

Avenija Dubrovnik 15, 10000 Zagreb  
TEL:01/3667-101  
FAX:01/3667-102  
ŽIRO RAČUN: HR8223600001102020550  
MB: 080655731 OIB:53921712112

### Obrazac R1

Račun br.

164/1/1

Datum izdavanja: 7.3.2019.

Mjesto izdavanja: Zagreb

OIB kupca: 55893106593

Dospijeće: 27.03.2019

## Vuković Intelligent System d.o.o.

Horvaćanska cesta 170  
10000 Zagreb

RB	Opis proizvoda/usluge	Količina JM	Cijena	Rabat	PDV	Iznos
1	Troškovi usluga inkubiranja 03/2019	20,00 m2	75,00	65%	25%	525,00
Slovima: šestopedesetšest KN dvadesetpet lp						Osnovica: 525,00
						Rabat: 975,00
						PDV: 131,25
						<b>Za naplatu (KN): 656,25</b>
<b>Porezna tarifa</b>		<b>Osnovica</b>	<b>PDV</b>			
PDV 25%		525,00	131,25			
		525,00	131,25			

# Questions ?

