



The Future of Data Entry

Robotic Process Automation in Oracle Apex and Beyond



Lecturer

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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!

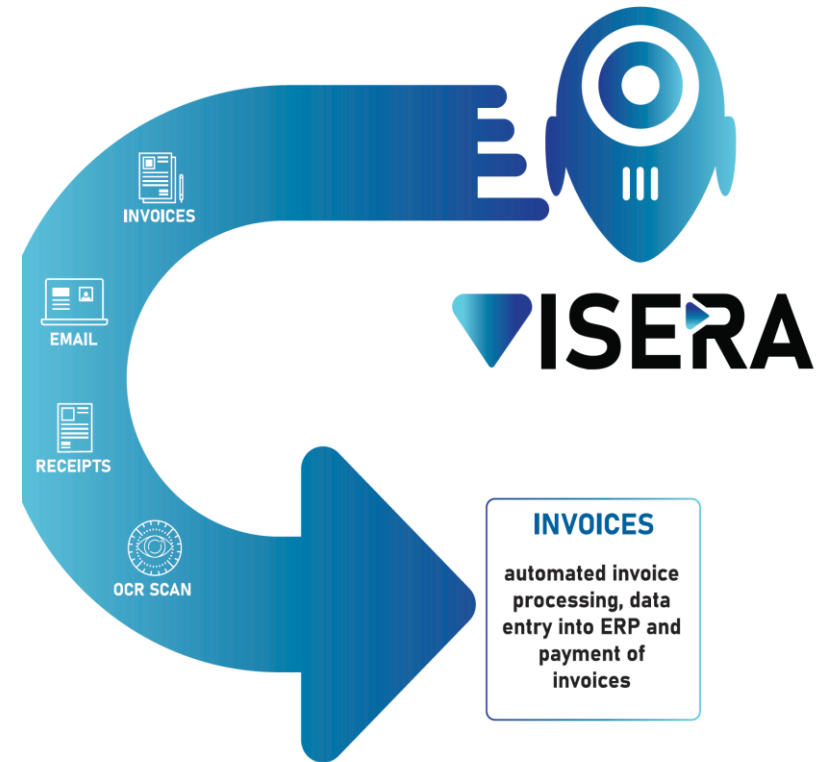
Obviously, data entry from structured sources could be automated. So, what are the solution(s)?

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



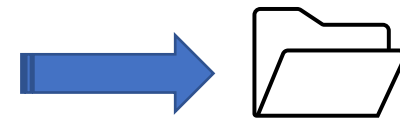
Automated Testing

Example: Payroll Automation

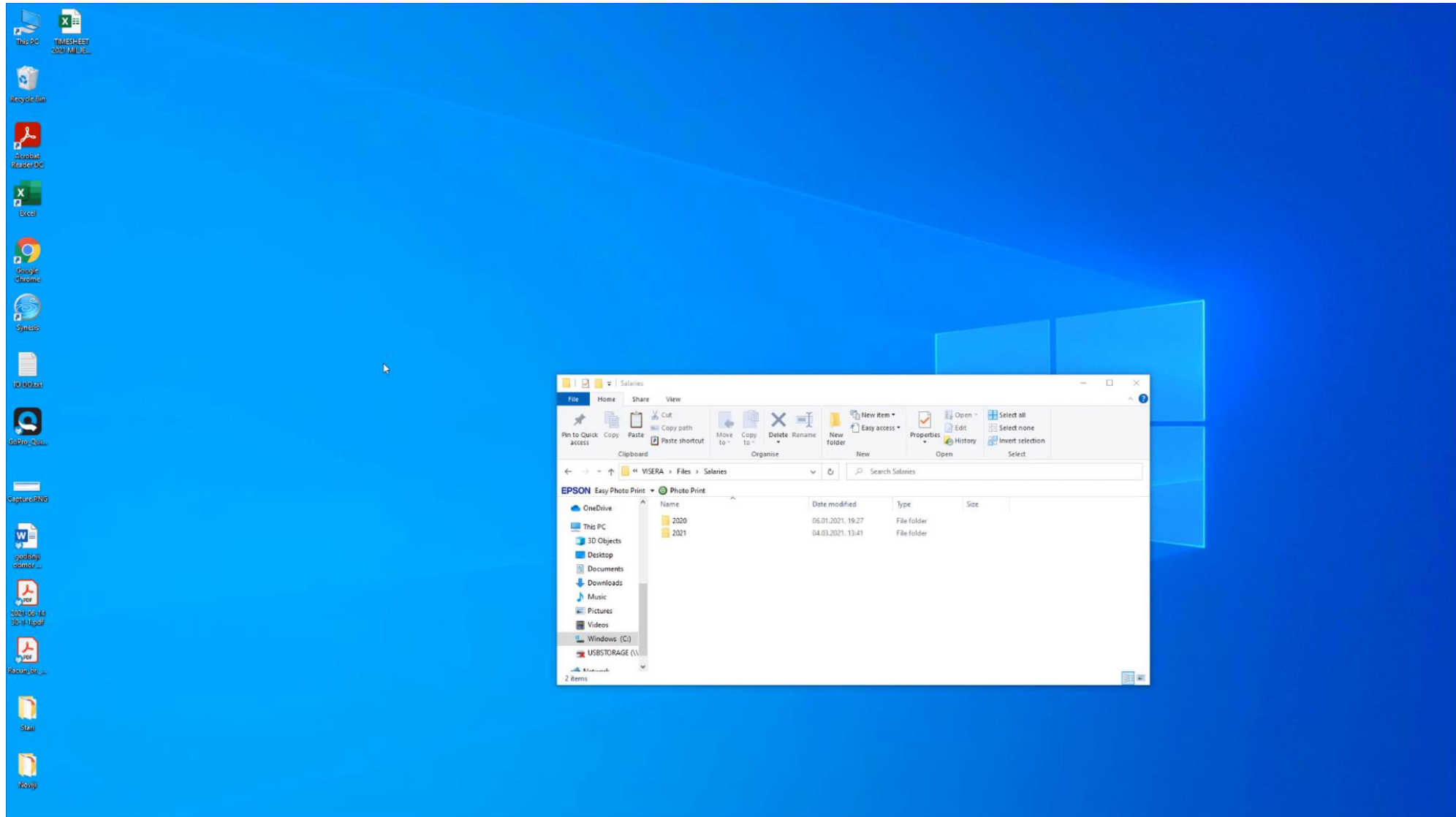
- Used to be: manual entry of hours worked for each employee into ERP, preparation of legal reports and documents, sometimes even manual payment of each net salary, tax amount, contribution....

- 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
				Ukupno kn:		400,00
				Obračun prema naplaćenju naknadi		

Fiskalizacija računa

Način plaćanja	Oznaka operatera	Datum	Vrijeme
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BIBA SPEED d.o.o.
Ilica 1, Zagreb
MB: 002365
MBS: 002365455
OIB: _____
IBAN: HR1231231234123



Example: Invoices

The screenshot shows a web browser window displaying the e-Računi application. The browser's address bar shows the URL `e-racuni.com/H2f/WOB-Qv3O2oEnwa5pnD6W3oI5JzyB-1-1.html?action=firstPage`. The browser's toolbar includes navigation buttons and a search bar. Below the browser window, the application's header features the logo "e-Računi" with the tagline "online poslovni programi" and the user information "MILJENKO VUKOVIĆ (MILJENKO.VUKOVIC@INTELLIGENT-SYSTEMS.HR) / Vuković Intelligent Systems". A blue navigation bar contains menu items: "Contacts", "Sales", "Purchasing", "Stocks", "Travel expenses", "Bank", "Cash book", "Payroll", and "Accounting". Below this bar, a secondary menu lists "Izlazni računi", "Novi račun", "Ponude", "Formiranje nove ponude", "Putni nalozi", "Novi putni nalog", and "Postavke maske programa". The main content area is currently blank.

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

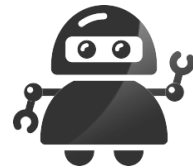


RAPID IMPLEMENTATION AND ROI
REDUCES THE NUMBER OF FTES IN A PROCESS

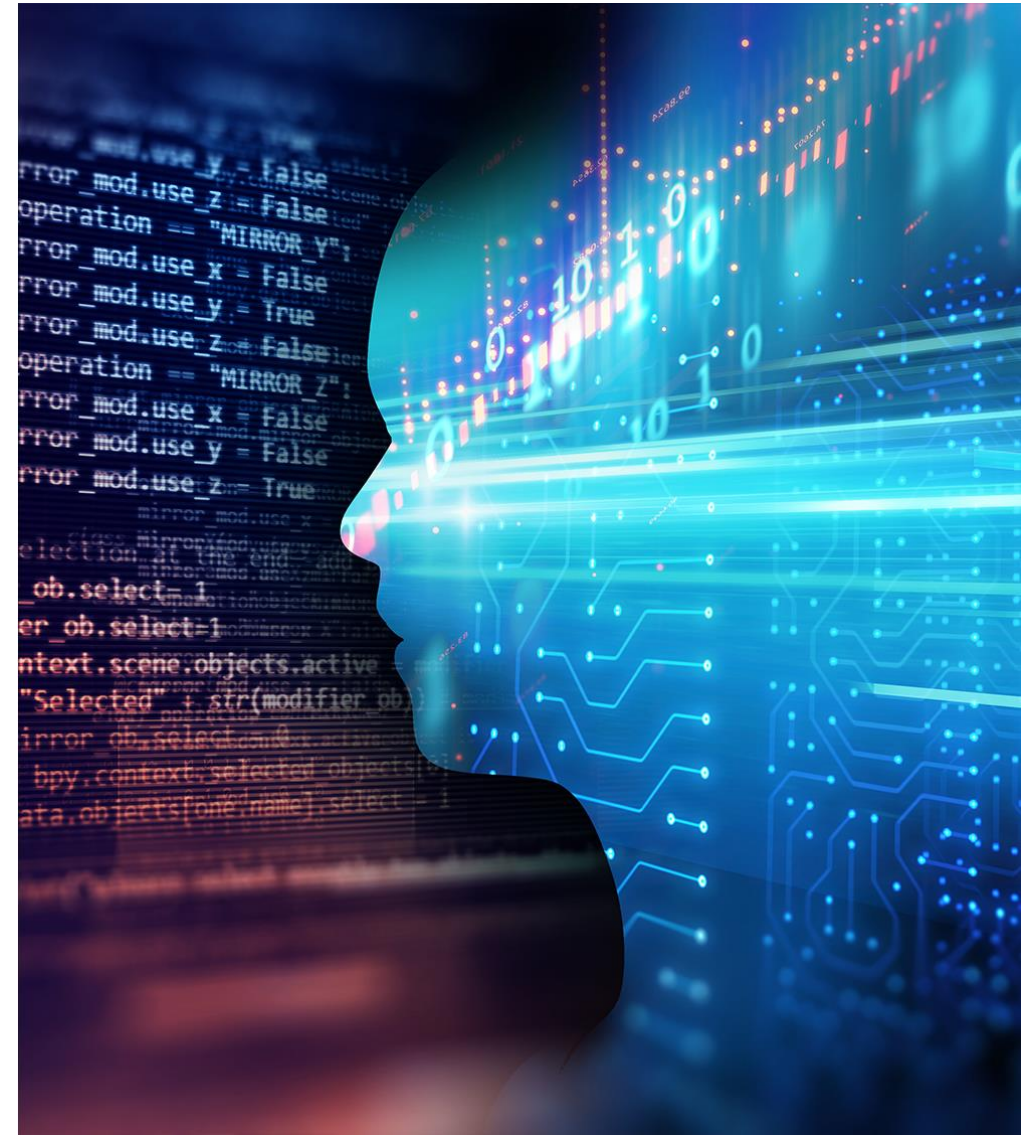
How RPA Works?

- 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



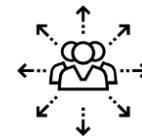
Complex, Rules Based Tasks



High Quantity / Repetition



Don't deal with unstructured data

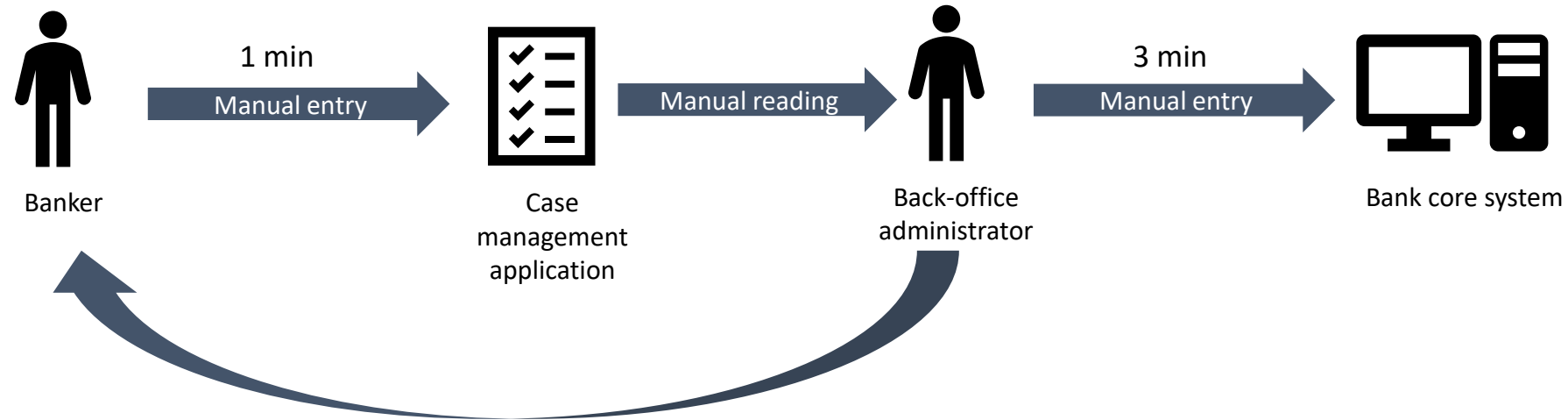


Difficulty of Outsourcing

Two important aspects:

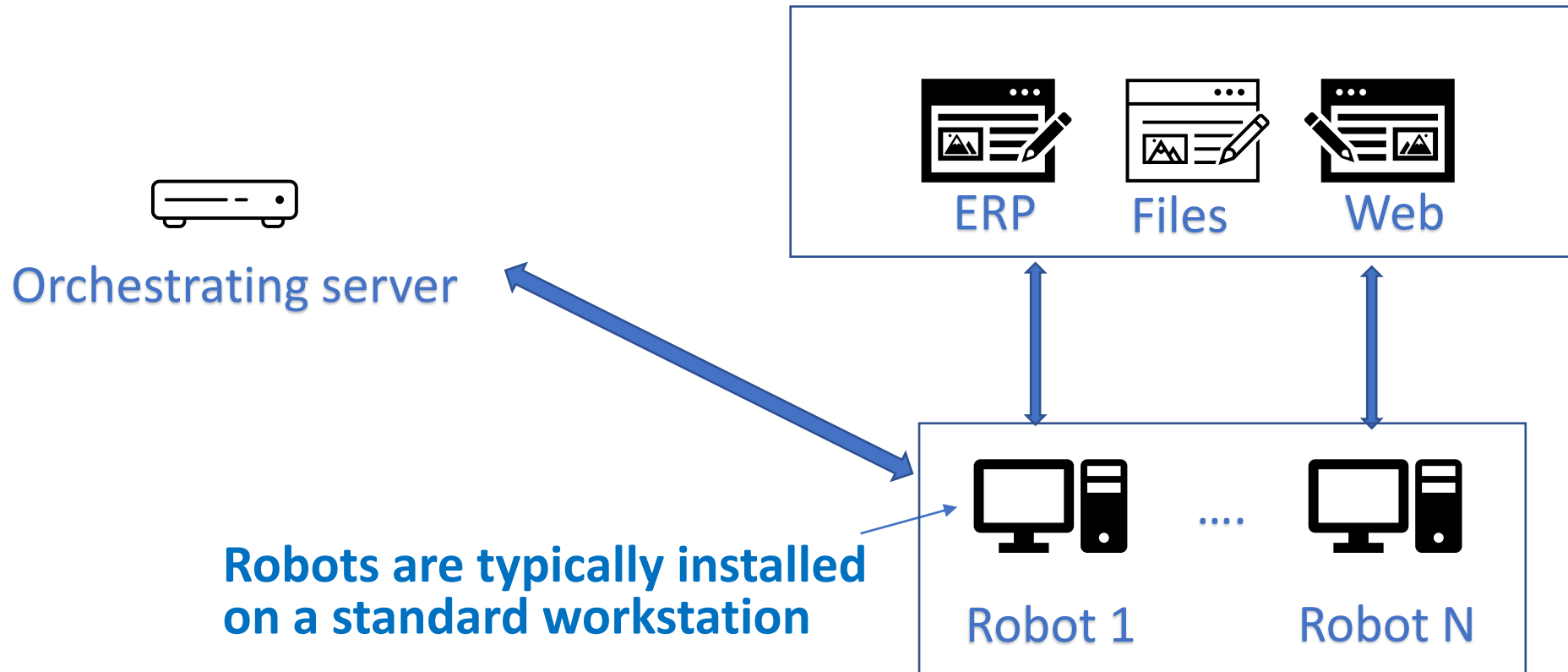
- We don't have to cover all different types of cases in the process
- We don't have to robotize the whole process

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"/>
Pošanski 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"/>
U kojem poduzeću radite?	Ne radim <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.

Datum	Potpis
<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

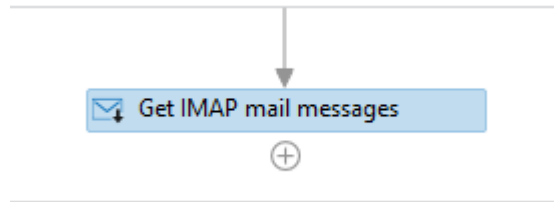
Possible solutions

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

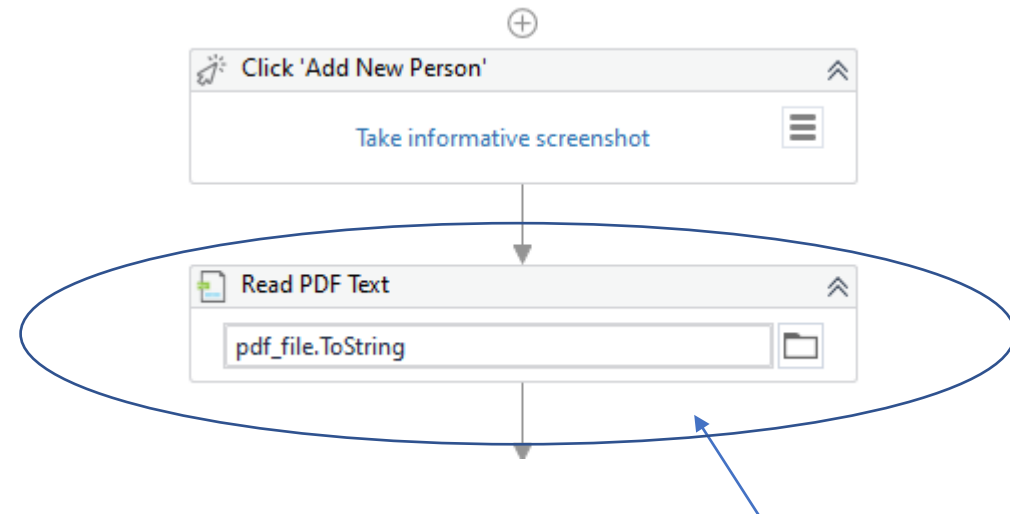


Common	
DisplayName	Get IMAP mail messages
TimeoutMS	Specifies the amount of time (i ...
Host	
MailFolder	"Inbox" ...
Port	993 ...
Server	serverXml ...
Logon	
Email	EEmailAttachment ...
Password	EEmailAttachmentPassword ...
Misc	
Private	<input type="checkbox"/>
Options	
DeleteMessages	<input type="checkbox"/>
MarkAsRead	<input checked="" type="checkbox"/>
OnlyUnreadMessages	<input checked="" type="checkbox"/>
SecureConnection	Auto
Top	10 ...
Output	
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 assignment steps. An "Expression Editor" dialog box is open over the second step, "Assign Lastname".

The workflow steps are:

- 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

The "Expression Editor" dialog box shows the following content:

Value (String)

```
1 Split(Split(output_text.ToString, "lme i prezime ")(1), " ")(0).ToString.Replace(vbCrLf, "").Trim
```

Buttons: OK, Cancel

Robot development – entering data in Apex

The image displays a robot development workflow for entering data into an Apex application. The workflow is contained within a window titled "Attach Window 'New Person'" and is organized into a "Do" container. The steps are as follows:

- Type Into 'INPUT_P15_FIRSTNAME'**: Includes a "Take informative screenshot" step and a dropdown menu set to "Firstname.ToString".
- Type Into 'INPUT_P15_LASTNAME'**: Includes a "Take informative screenshot" step and a dropdown menu set to "Lastname.ToString".
- Type Into 'INPUT_P15_ADD'**: Includes a "Double-click to view" step.
- Type Into 'INPUT_P15_CITY'**: Includes a "Double-click to view" step.
- Type Into 'INPUT_P15_POS'**: Includes a "Double-click to view" step.
- Type Into 'INPUT_P15_PERS'**: Includes a "Double-click to view" step.

A "Selector Editor" window is open, showing the selected element's attributes and selector code. The "Edit Attributes" section lists the following attributes:

- app: chrome.exe
- title: 127.0.0.1:8080/apex/*
- id: P15_LASTNAME
- type: text

The "Edit Selector" section shows the following selector code:

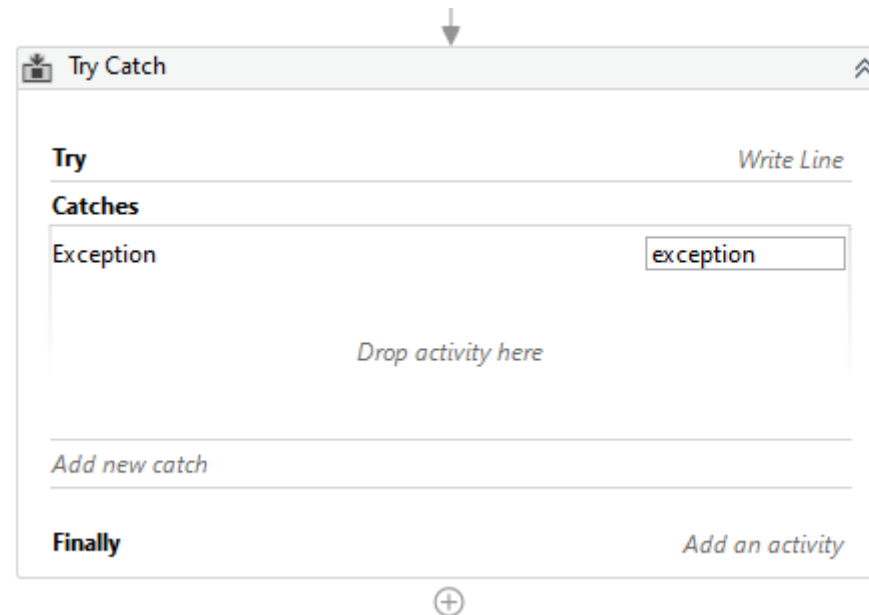
```
<html app='chrome.exe' title='127.0.0.1:8080/apex/*' />  
<webctrl id='P15_LASTNAME' tag='INPUT' type='text' />
```

The "Selector Editor" window also includes buttons for "Validate", "Indicate Element", "Repair", "Highlight", "Open in UI Explorer", "OK", and "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!

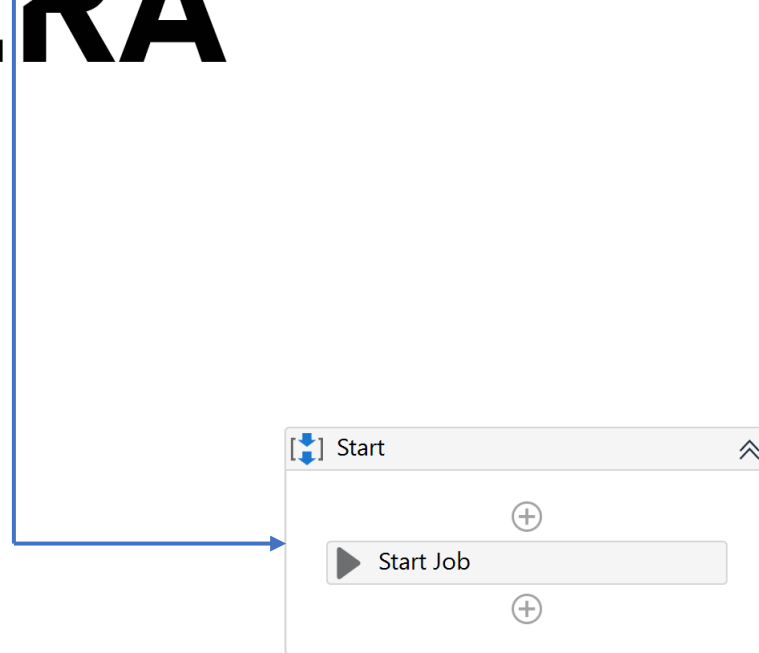
Powerpoint never (??) crashes! 😊

No really. Show us demo.

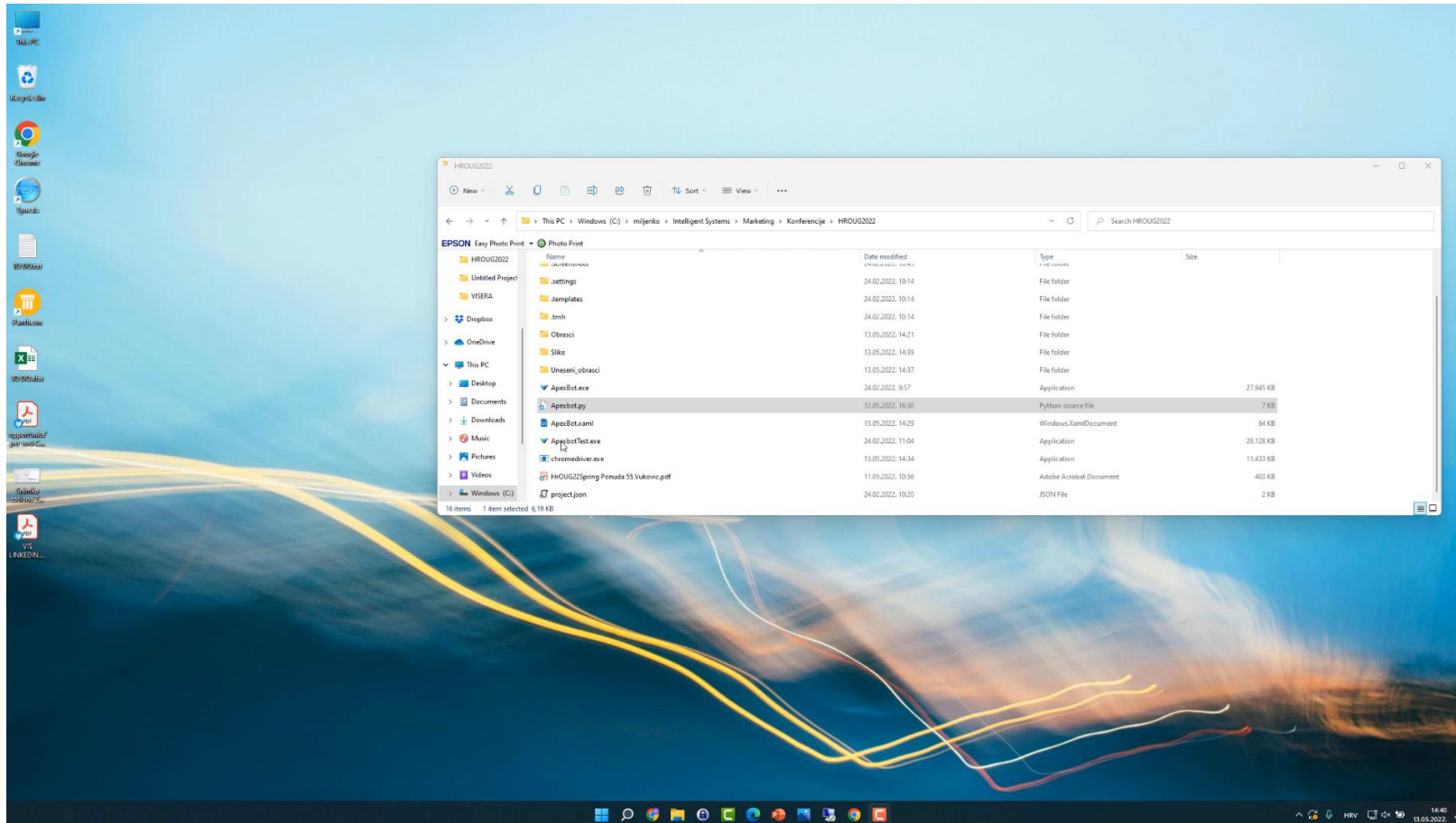
OK.

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



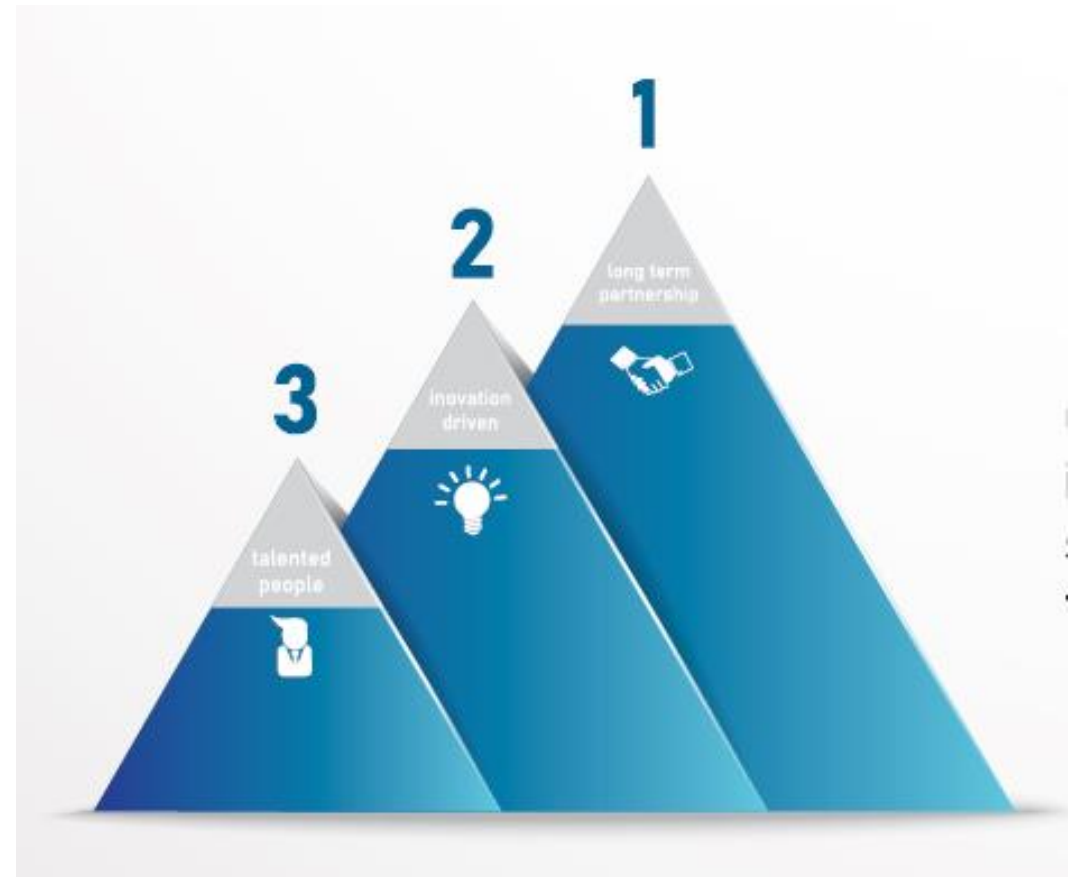
- Rule Based Process
- Currently Requires Significant Workload and / or...
- ...the Frequency and Cost of Human Errors is significant
- Changes in the Process are Relatively Rare
- Etc.

RPA Process Estimation

	Simple complexity	Medium complexity	High complexity
Description	<ul style="list-style-type: none">• ~10-20 process steps• Simple validations and rules• Up to 2 systems involved	<ul style="list-style-type: none">• ~25-40 process steps• Some validations and simple/ few exceptions• 3-5 systems involved	<ul style="list-style-type: none">• ~45-60 process steps• Complex validations and multiple exceptions• 5-7 systems involved
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
						Za naplatu (KN): 656,25
Porezna tarifa		Osnovica	PDV			
PDV 25%		525,00	131,25			
		525,00	131,25			

Questions ?

