HOW-R-U?

Suite of e-coaches aimed to analyse human behaviour

Author:

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Oresti Baños Legrán

17th July 2020

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- Mental disorders are very common in our society.
- Doctors have high workloads.

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- Mental disorders are very common in our society.
- Doctors have high workloads.
- Mental diseases are taboo.

Objections.

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- Mental disorders are very common in our society.
- Doctors have high workloads.
- Mental diseases are taboo.
- No continuous traceability of patient's health status.

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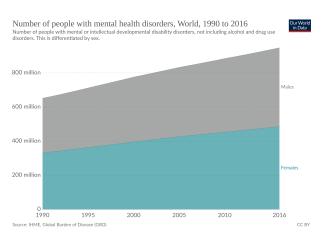


Figure: Number of people with mental health disorders

Reprinted from (Ritchie & Roser, 2018).

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 Technology is becoming increasingly integrated into our lives.

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- Technology is becoming increasingly integrated into our lives.
- Smartphones are used in a daily basis.

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- Technology is becoming increasingly integrated into our lives.
- Smartphones are used in a daily basis.
- Chatbots are growingly becoming popular.

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- Technology is becoming increasingly integrated into our lives.
- Smartphones are used in a daily basis.
- Chatbots are growingly becoming popular.
- In Spain there are 2 psychologists per 100.000 citizens (Vicente, 2019).

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• *E-coaches* suite as chatbots.

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- Doctors can assign questions to patients.

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- E-coaches suite as chatbots.
- Doctors can assign questions to patients.
- Data analysis.

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- E-coaches suite as chatbots.
- Doctors can assign questions to patients.
- Data analysis.
- Psychologist bot.

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• Main goal:

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• Main goal:

 To develop a conversational-agent-as-a-sensor which will be able to interact with a person with a disorder and ask questions defined by specialists

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• Main goal:

- To develop a conversational-agent-as-a-sensor which will be able to interact with a person with a disorder and ask questions defined by specialists
- Secondary goals.

• Main goal:

 To develop a conversational-agent-as-a-sensor which will be able to interact with a person with a disorder and ask questions defined by specialists

Secondary goals.

 To design a graphical web interface where doctors can consult their patient's responses.

• Main goal:

 To develop a conversational-agent-as-a-sensor which will be able to interact with a person with a disorder and ask questions defined by specialists

- To design a graphical web interface where doctors can consult their patient's responses.
- To design a flexible and scalable architecture to add functionality to the system.

• Main goal:

 To develop a conversational-agent-as-a-sensor which will be able to interact with a person with a disorder and ask questions defined by specialists

- To design a graphical web interface where doctors can consult their patient's responses.
- To design a flexible and scalable architecture to add functionality to the system.
- To design an architecture based on containers to host the different system modules.

• Main goal:

 To develop a conversational-agent-as-a-sensor which will be able to interact with a person with a disorder and ask questions defined by specialists

- To design a graphical web interface where doctors can consult their patient's responses.
- To design a flexible and scalable architecture to add functionality to the system.
- To design an architecture based on containers to host the different system modules.
- To implement a system that covers the previous goals.

• Main goal:

 To develop a conversational-agent-as-a-sensor which will be able to interact with a person with a disorder and ask questions defined by specialists

- To design a graphical web interface where doctors can consult their patient's responses.
- To design a flexible and scalable architecture to add functionality to the system.
- To design an architecture based on containers to host the different system modules.
- To implement a system that covers the previous goals.
- To test a beta version of the assistant in real people and analyse the retrieved data as well as target audience's feelings about it.

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Number of publications related to chatbots

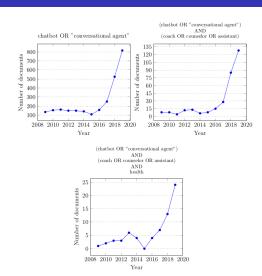


Figure: Search results of different queries performed in scopus.com.

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 - Nutrition
 - Psychology
 - etc.
- Target group.

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- Areas of application.
 - Dermathology
 - Nutrition
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 - etc.
- Target group.
 - Students

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- Areas of application.
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 - Nutrition
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- Target group.
 - Students
 - Doctors

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- Target group.
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Conversational agent types

• Coaches: help users to get what they want.

Conversational agent types

- Coaches: help users to get what they want.
- Counselors: help users to identify and solve problems.

Communication formats

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Platform	Daily active users (billions)	Free API for chatbots
(Facebook Messenger, 2008)	1.66	✓
(Whatsapp, 2009)	1.5	X
(WeChat, 2011)	1.083	✓
(Telegram, 2013)	0.2	✓
(Kik, 2010)	0.015	✓
(Discord, 2015)	0.014	✓
(<i>Slack</i> , 2013)	0.012	✓
(Viber, 2010)	0.008	✓
(Line, 2012)	0.00723	✓

Table: Comparison between different chat applications (2019).

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 Facebook likes can be helpful to predict people's sensitive properties (Kosinski, Stillwell, & Graepel, 2013).

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- Facebook likes can be helpful to predict people's sensitive properties (Kosinski et al., 2013).
- Whatsapp's end-to-end encryption methods are not secure enough (Rastogi & Hendler, 2017).

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- Facebook likes can be helpful to predict people's sensitive properties (Kosinski et al., 2013).
- Whatsapp's end-to-end encryption methods are not secure enough (Rastogi & Hendler, 2017).
- Telegram provides more privacy protection (Sutikno et al., 2016).

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- Must have requirements.
 - Ask questions to the patients.

- Must have requirements.
 - Ask questions to the patients.
 - Custom keyboard.

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- Must have requirements.
 - Ask questions to the patients.
 - Custom keyboard.
 - User's enrollment and deletion.

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- Must have requirements.
 - Ask questions to the patients.
 - Custom keyboard.
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 - File with patients' answers.

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- *Must have* requirements.
 - Ask questions to the patients.
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 - File with patients' answers.
 - Modularity.

- Must have requirements.
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- Should have requirements.

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 - Questions and answers should be modifiable.

- Must have requirements.
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 - Questions and answers should be modifiable.
 - Public questions.

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 - Modularity.
- Should have requirements.
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 - Questions and answers should be modifiable.
 - Public questions.
 - Configurable schedule.

- Must have requirements.
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 - File with patients' answers.
 - Modularity.
- Should have requirements.
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 - Questions and answers should be modifiable.
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- Could have requirements.
 - Numeric order of questions.
 - Custom questions frequency.
 - Other languages.
 - Password change.
 - Two factor authentication.

- Could have requirements.
 - Numeric order of questions.
 - Custom questions frequency.
 - Other languages.
 - Password change.
 - Two factor authentication.
 - Groups.

- Could have requirements.
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 - Delete data from users.

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 - Assign questions to all patients.

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 - Groups.
 - Delete data from users.
 - View and modify profile data.
 - Assign questions to all patients.
 - Timezones support.

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- Won't have requirements.

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- Won't have requirements.
 - Cross-platform.

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 - Assign questions to all patients.
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 - Share the retrieved data with third parties.

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Architecture

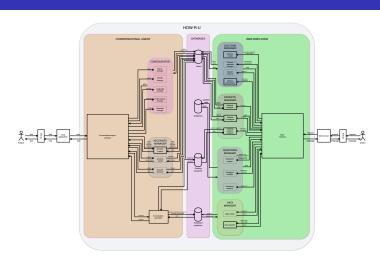


Figure: System architecture. Created using *diagrams.net* (*diagrams.net*, 2020).

Architecture

DATABASES CONVERSATIONAL AGENT CONFIGURATOR Name changer new configuration Gender changer ACK language Language changer profile picture Profile picture changer → Schedule changer Conversational gender Chat name, gender, ACCOUNTS agent language MANAGER language, schedule, schedule interface profile picture profile picture Pendina ACK Account creator questions ACK request patient id account data Account viewer patient data request request ACK Account remover -ACK patient id question response Conversation

Figure: System architecture (conversational agent and databases).

question

generator

patient id, question id

doctor id, response

answer date ACK

Answered

questions

Architecture

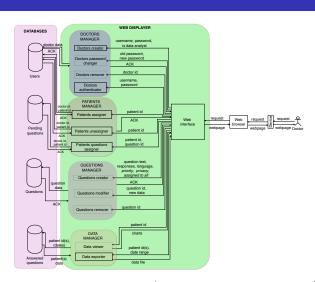


Figure: System architecture (web interface and databases).

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Implementation (databases)

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ForeignKey (id)
                                                                       ForeignKey (id)
patient
                 ForeignKey (identifier)
                                                       pet/ent
                                                                       ForeignKey (identifier)
                  ForeignKey (id)
                                                       question
                                                                       ForeignKey (id)
                  ForeignKey (id)
answer_date
                 DateTimeField
                                                                            abstract
                      sponse (answeredouestion)
                                                                          nheritance
                                                                      ForeignKey (id)
                    ForeignKey (id)
                                                                     ForeignKey (identifier)
     order
                    IntegerField
                                                                     ForeignKey (id)
                    CharField
                    question (response)
                Question
                                                                    Patient
                       ForeignKey (id)
                                                                       Charfield
  assigned to all
                                                                                                      doctor (journalentry)
  frequency
                       Charfield
                                                         schedule
                                                                        DateTimeField
  language
                                                                       Charfield
                                                        language
                       IntegerField
                                                                       Charfield
  public
                       BooleanField
                                                        username
                                                                       Charfield
                       Charfield
                                                                 assigned_doctors (patient)
                                                          OneToOneField (id)
                                                         BroleanField
                                                            user (doctor)
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 - · Question handler.
- Jobs.
 - PendingQuestionJob

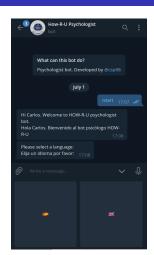


Figure: Agent showing the welcome message and asking for language selection.

```
Please specify the time when you would like to receive questions in
HH:MM format (24h)
You have been successfully registered into the system. 18:55
How do you feel today? 10:00
                                                                             0-2 hours
                                                                             2-4 hours
                                                                             4-6 hours
                                                                             6-8 hours
```

Figure: HOW-R-U converstional agent asking a question to a patient.

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 - Questions manager.
 - Patients manager.
 - Data viewer.

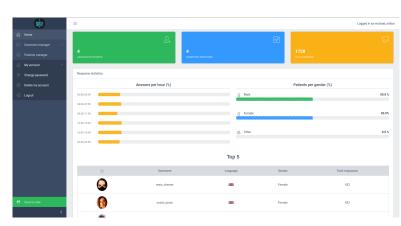
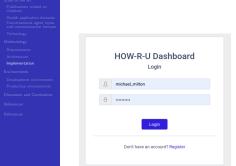


Figure: HOW-R-U homepage.



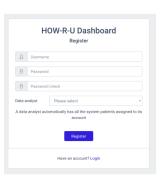


Figure: Doctors manager.

Question text (empty to get all guestions) Q, Search Question text Possible responses Assigned to all Frequency Priority Creator Language Yes michael_milton (You) Do you feel sad and cry easily? Daily No Yes × Have you felt insecure about yourself today? Daily john_clive # No Sad Tired How do you feel today? Daily michael_milton (You) # Нарру Very happy 0-2 hours 2-4 hours How long have you slept today? 4-6 hours Daily michael milton (You) #

More than 8 hours

Figure: Public questions page.

Actions

Add to My Questions

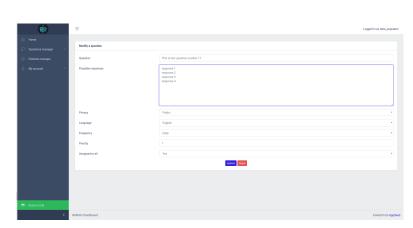


Figure: Questions creator and modifier.

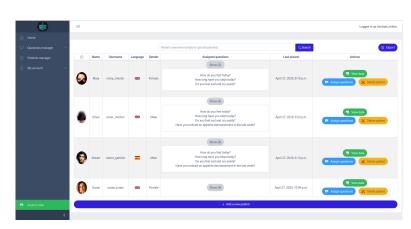


Figure: Patients manager.

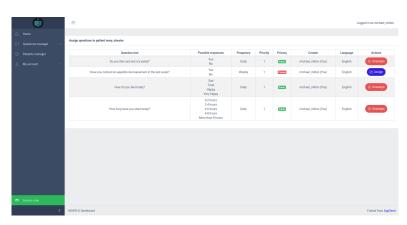


Figure: Patients manager assign questions page.

```
Select patients to export
                                            susan iones
                                            robert_garfield
                                            oliver_morton
                                            mary_chester
                                            04/01/2020
                                                                                                                                                                Start date
                                          Please enter a valid date
                                            mm/dd/yyyy
End date
                                            June 2020 *
                                                                \uparrow \downarrow
                                                                            Submit Reset
                                                 8 9 10 11 12 13
                                             5 6 7 8 9 10 11
                                                                  Today
```

Figure: Export page

Patient username	Question	Answer	Date
robert_garfield	How do you feel today?	Tired	2020-04-01 04:12:20
robert_garfield	How do you feel today?	Sad	2020-04-02 05:24:20
robert_garfield	How long have you slept today?	0-2 hours	2020-04-01 12:56:20
robert_garfield	How long have you slept today?	4-6 hours	2020-04-02 11:28:20
robert_garfield	Do you feel sad and cry easily?	Yes	2020-04-01 14:22:21
robert_garfield	Do you feel sad and cry easily?	No	2020-04-02 06:31:21
oliver_morton	How do you feel today?	Very happy	2020-04-01 01:45:19
oliver_morton	How do you feel today?	Нарру	2020-04-02 02:59:19
oliver_morton	How long have you slept today?	More than 8 hours	2020-04-01 20:51:20
oliver_morton	How long have you slept today?	2-4 hours	2020-04-01 22:24:20
oliver_morton	Do you feel sad and cry easily?	No	2020-04-01 07:47:20
oliver_morton	Do you feel sad and cry easily?	Yes	2020-04-02 17:26:20
oliver_morton	Have you noticed an appetite decreasement in the last week?	Yes	2020-04-01 21:41:20
oliver_morton	Have you noticed an appetite decreasement in the last week?	Yes	2020-04-08 21:09:20

Table: Example data generated with the *Export* feature.

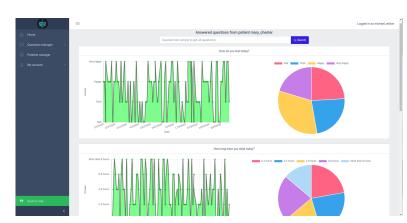


Figure: View data page.

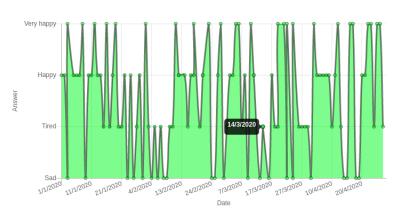


Figure: View data page (line chart).

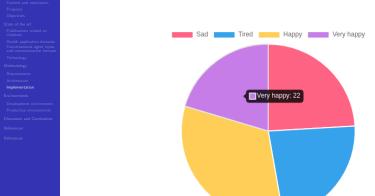


Figure: View data page (pie chart).

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Development environment

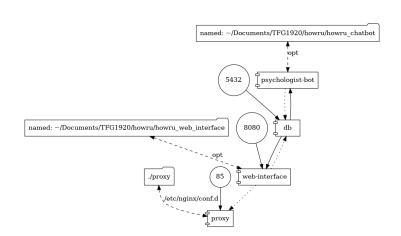


Figure: Docker-compose file schema. Generated by (PSIH, 2016).

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Production scalable environment

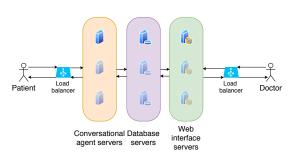


Figure: Scalable environment architecture diagram. Created using diagrams.net (diagrams.net, 2020).

Production non-scalable environment

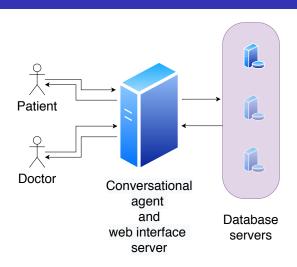


Figure: Non-scalable environment architecture diagram. Created using *diagrams.net* (*diagrams.net*, 2020).



Production one-instance environment

```
Patient

Doctor

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Figure: One-instance environment architecture diagram. Created using *diagrams.net* (*diagrams.net*, 2020).

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STRENGTHS

- 1. Different scenarios.
- 2. Multiple e-coaches.
- 3. Intuitive interface.
- 4. No extra software for patients.

OPPORTUNITIES

- 1. COVID-19 data analysis.
- 2. Telegram ensures privacy.

WEAKNESSES

- 1. Telegram is not used by the majority of people.
- 2. System deployment requires knowledge on computer science.

HREATS

- 1. Elderly people may not know how to use Telegram.
- If patients do not have Telegram installed, they could install a specific app instead of Telegram.
- 3. Not all patients have smartphones.

Figure: HOW-R-U SWOT analysis. Based on http://www.mostlycolor.ch/2015/07/swot-matrices-in-latex.html.

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Discussion and Conclusions

• Main goal: to develop a *conversational-agent-as-a-sensor* which will be able to interact with a person with a disorder and ask questions defined by specialists.

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- Secondary goals.

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 - To design a graphical web interface where doctors can consult their patient's responses.

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- Secondary goals.
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 - To design a flexible and scalable architecture to add functionality to the system.

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 - To design an architecture based on containers to host the different system modules.

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 - To implement a system that covers the previous goals.

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 - To implement a system that covers the previous goals.
 - To test a beta version of the assistant in real people and analyse the retrieved data as well as target audience's feelings about it.

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Bibliography I

Creative commons. (2001).

https://creativecommons.org/.

diagrams.net. (2020). Retrieved from https://www.diagrams.net/

```
Discord. (2015). https://discordapp.com/.

Django. (2020). https://djangoproject.com.

Facebook messenger. (2008).

https://www.facebook.com/messenger/.

Kik. (2010). https://www.kik.com/.

Kosinski, M., Stillwell, D., & Graepel, T. (2013). Private traits and attributes are predictable from digital records of human behavior. Proceedings of the National Academy of Sciences, 110(15), 5802-5805.

Line. (2012). https://line.me/.
```

Bibliography II

- PSIH, G. (2016). docker-compose-viz. https://github.com/pmsipilot/docker-compose-viz.
- Rastogi, N., & Hendler, J. (2017, 01). Whatsapp security and role of metadata in preserving privacy.
- Ritchie, H., & Roser, M. (2018). Mental health. *Our World in Data*.
- Slack. (2013). https://slack.com/.
- Sutikno, T., Handayani, L., Stiawan, D., Riyadi, M., & Subroto, I. (2016, 06). Whatsapp, viber and telegram which is best for instant messaging? *International Journal of Electrical and Computer Engineering (IJECE)*, 6, 909.
- Telegram. (2013). https://telegram.org/.
- Van Rossum, G., & Drake, F. L. (2009). *Python 3 reference manual*. Scotts Valley, CA: CreateSpace.
 - Viber. (2010). https://www.viber.com/.

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Vicente, D. (2019). La ratio de psicólogos, a 16 puntos de europa. *El Mundo*.

Wechat. (2011). https://www.wechat.com/.

Whatsapp. (2009). https://www.whatsapp.com/.

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Thank you for your attention

Time for questions