Providing multi-medicine follow-up of polypharmacy patients

Nureddin Kamadan *Ersin Ertürk* *Furkan Güneş*

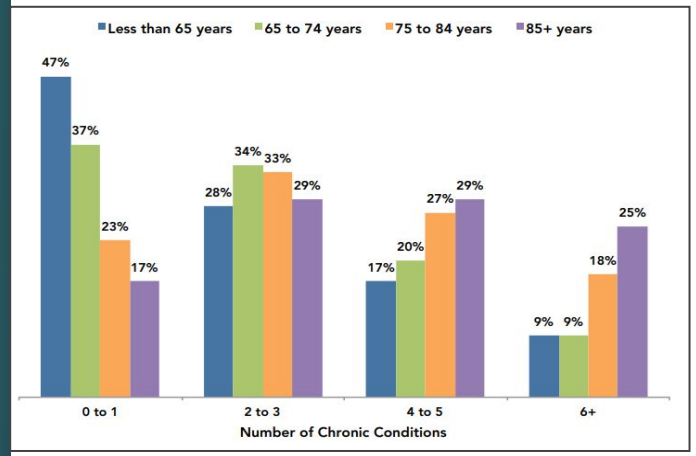
Need for Medication Follow-up

Elders':

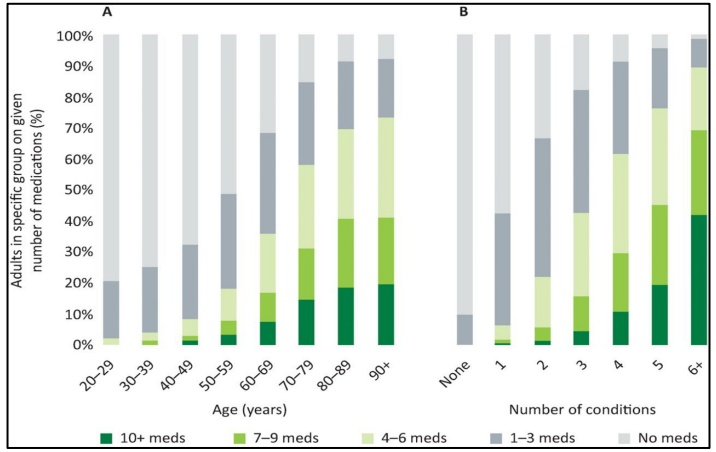
- **91%** have at least one
- **73%** have two or more chronic conditions. [1]

- The number of patients with polypharmacy is **320 million** (for elders)[2]

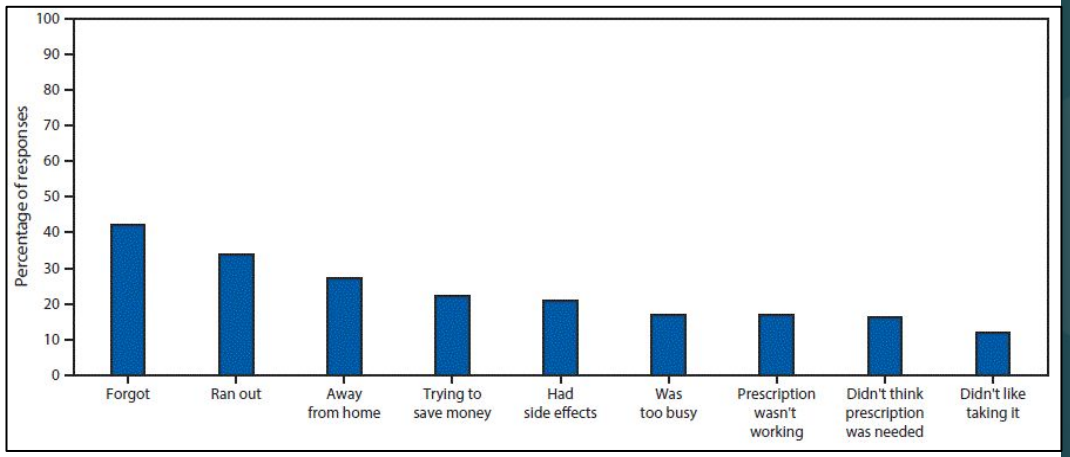
- Approximately **50% of patients** do not take their medication as prescribed. It causes an increase in morbidity (illness) and death.[3]
- One of the most common medication faults is forgetting by **%42**.[4]



Percentage Distribution of Chronic Diseases in the World Population by Age[5]



Number of Medications[6]



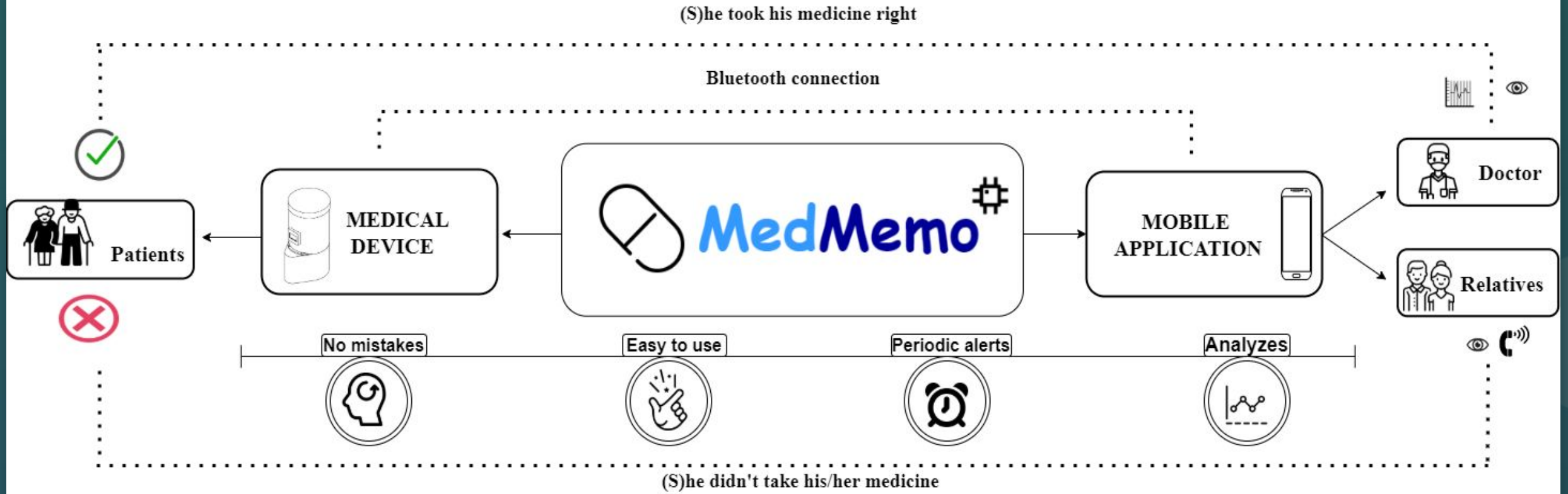
Reasons of Medication Faults[4]

- **41%** of medication errors are **clinically important**. [7]
- **22%** of medication errors have the potential **to harm** the patient.[8]

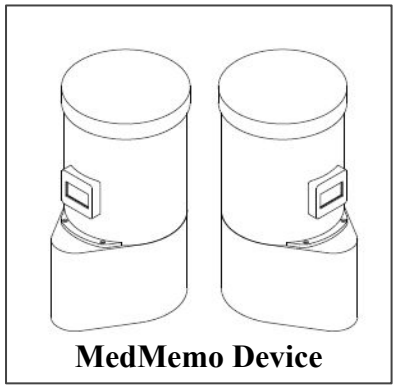
- It is estimated that medication faults causing a financial cost of approximately **100 billion dollars per year**. [3]

- Scientific data show that medication follow-up is a vital need. We produce a rational solution called "MedMemo" to meet this need.

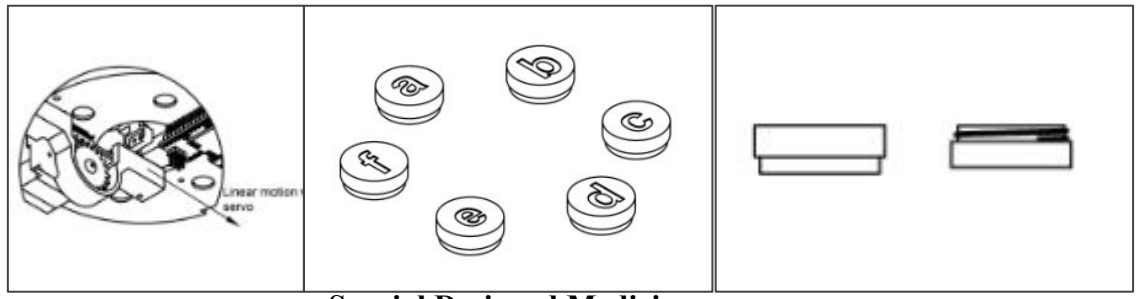
System of MedMemo



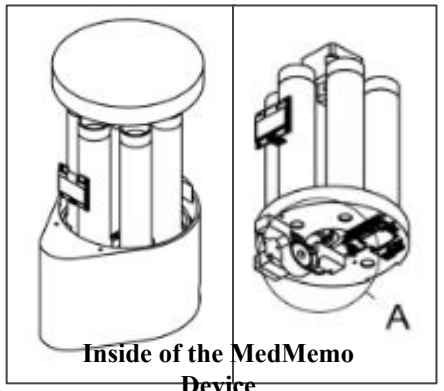
DRAWINGS



MedMemo Device



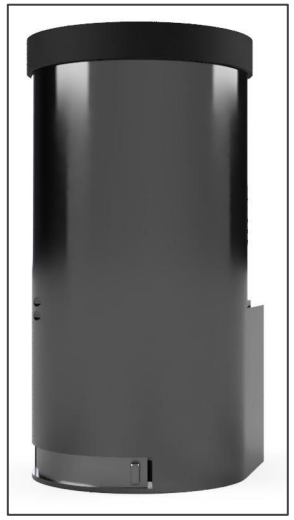
Special Designed Medicine Capsuls

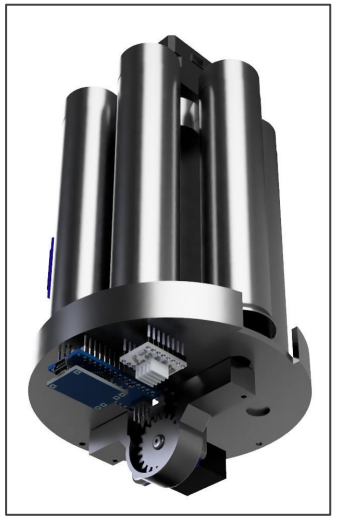


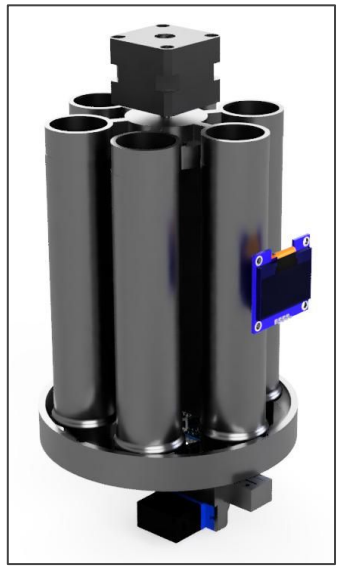
Inside of the MedMemo Device

System of MedMemo

- Portable
- 6 different capsul chamber
- Reminder alarms
- No connection between drugs
- Easy follow-up for patient relatives
- Medication analysis
- Overdose taking is impossible
- Easy to adapt to treatment
- Integrated with mobile application
- Total 84 medicine capacity
- No more dose skipping

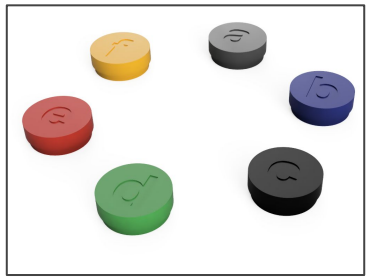






The system consist of:

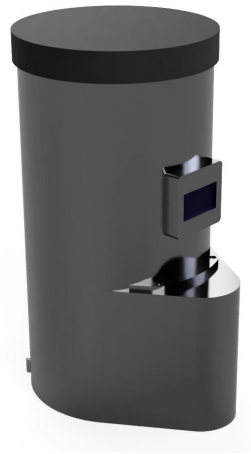
- Arduino nano
- Step motor driver
- Step motor
- Color sensor
- Servo motor
- Lithium batteries
- Lithium battery charger
- Oled screen



The only thing the patient should do is open the lid and take the medicine in the drawer when (s)he hears the alarm.

Differences of MedMemo

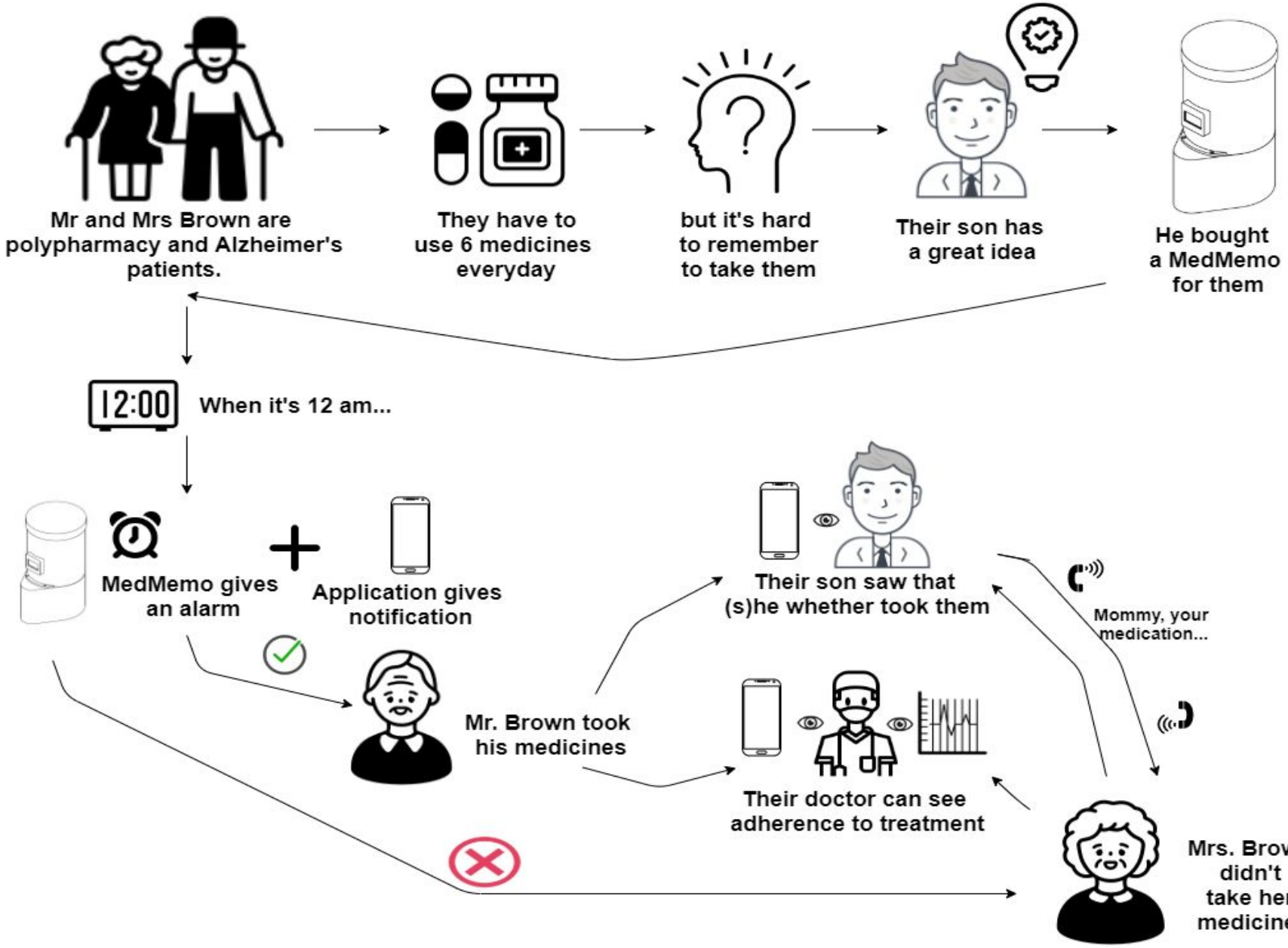
Others



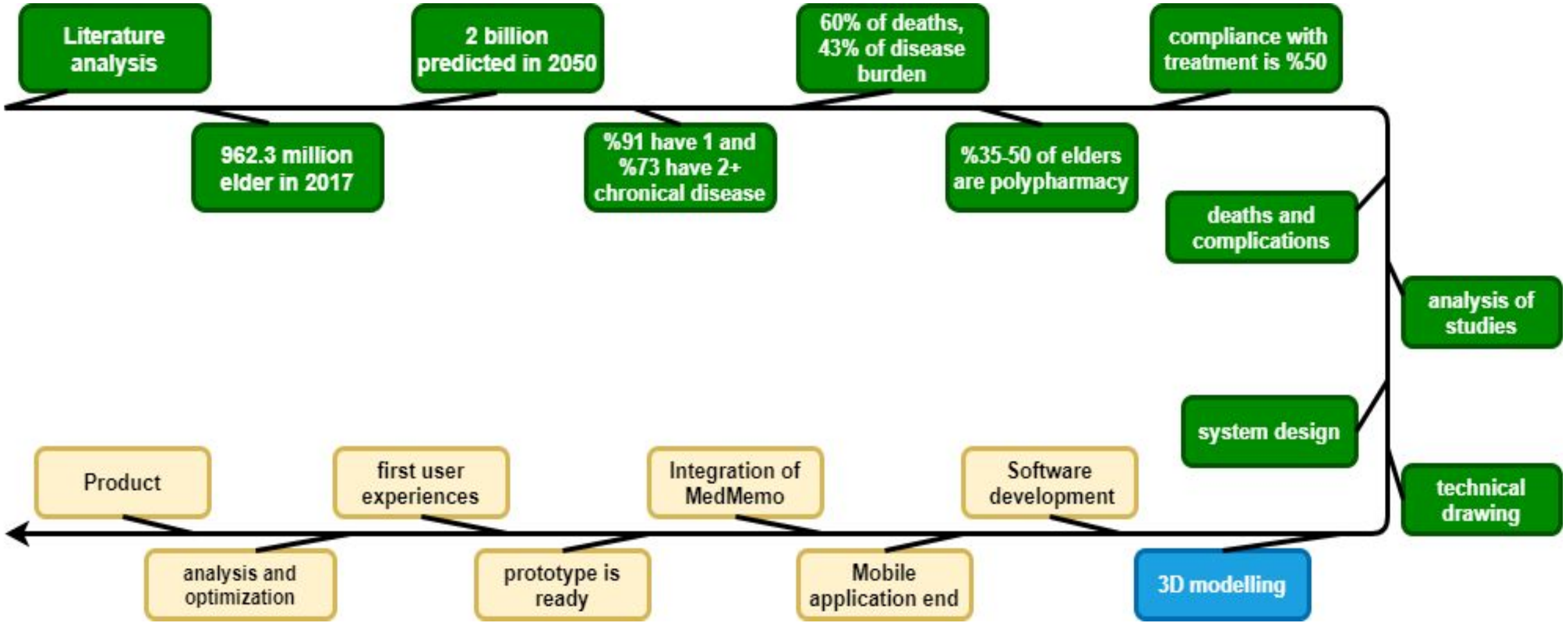
MedMemo

	Medmemo	Others
6 different medication follow-up for polypharmacy patients	✓	✗
Overdose control	✓	✗
No direct contact with oxygen - no deformation	✓	✗
No contact with other medications	✓	✗
Suitable design for Alzheimer's and dementia patients	✓	✗
Recorded medication for treatment adaptation	✓	✗
We can know which medicine was taken	✓	✗
Mistake prevention systems	✓	✗

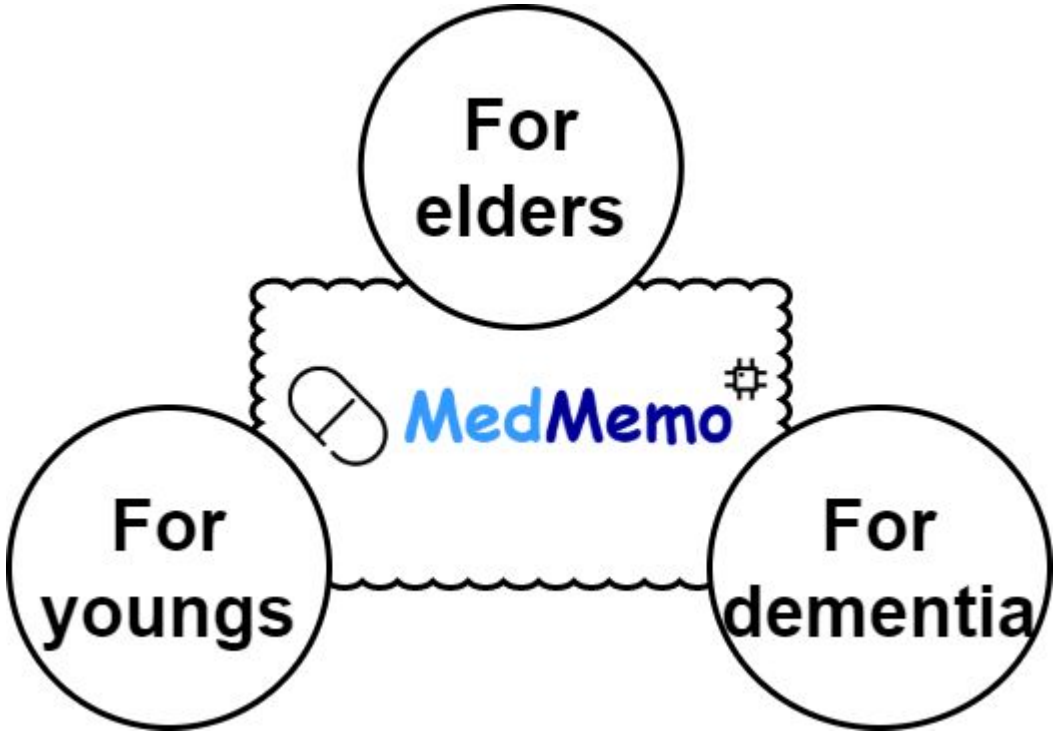
Example of MedMemo's Implementation



What is Our Story? Discovery and Users



Scale and Sustantion of MedMemo



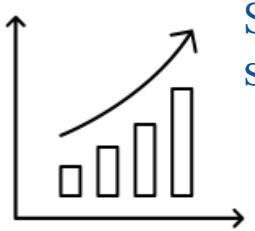
We divided the project into 3 parts. We have 3 target groups and a forward plan. Below are the works we will do:

For Elders: 6 medication follow-up

For Youngs: 3 medication follow-up

For Dementia: 6 medication follow-up , constant follow up

Future Versions: Integration to smart clocks , adapting to local health services



Scientific data show that the need for similar systems will increase day by day.

- Appeal to the large population
- The population addressed is increasing every year

Some parts of the system will be sold for a sustainable income model:

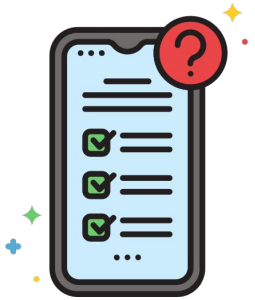
- Colored medicine capsules as consumable
- Additional disease oriented subscription

The Predicted Impact of MedMemo

- Prevention of dose faults
- Solution for forgetting to take medicine
- Removing the burden of medicine follow-up on patients and their relatives
- Ensuring that patients' compliance with medication treatment increases much **higher than 50%**
- Ensuring that the patient takes more than one medicine type at the same time correctly

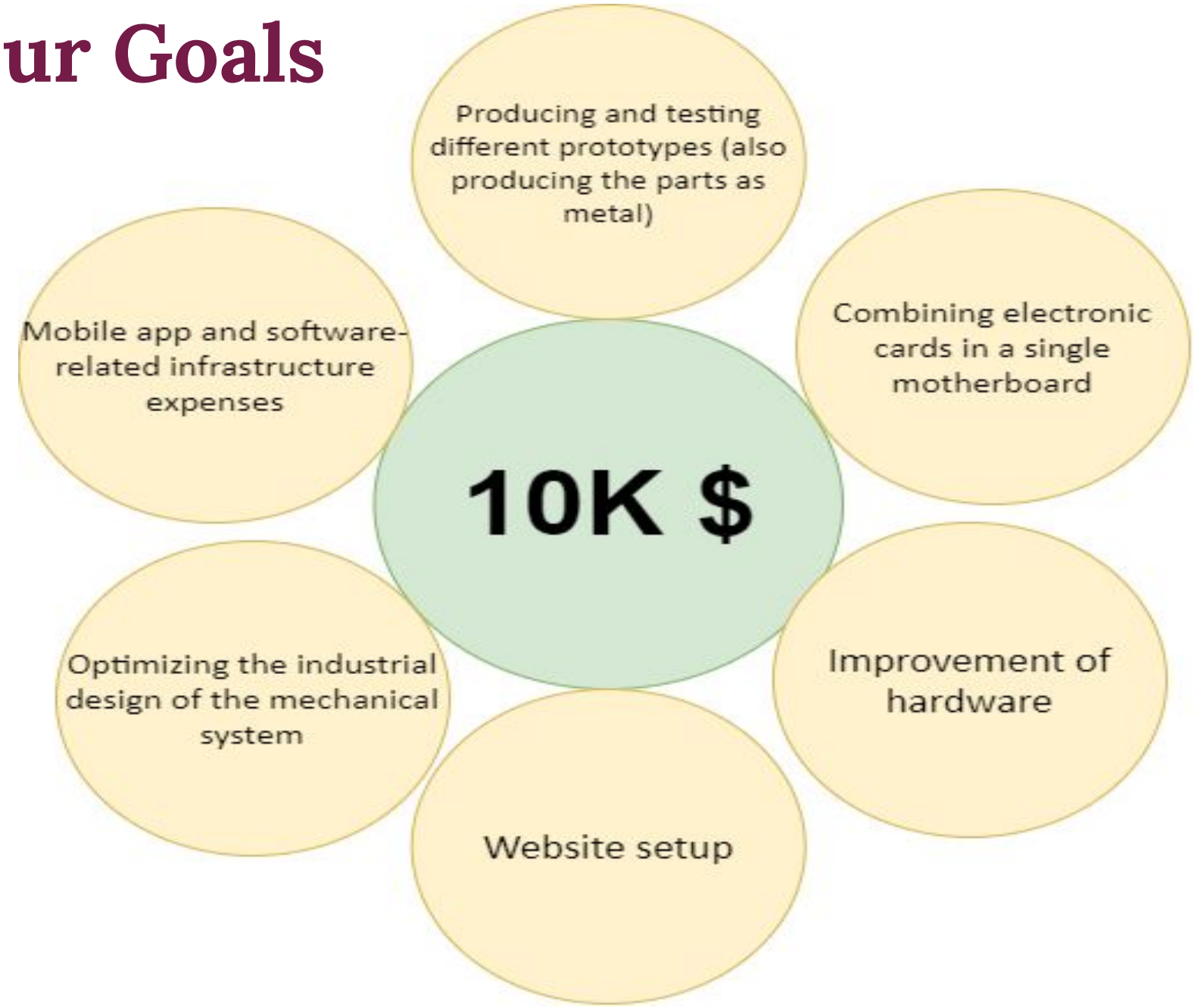
- Medmemo users' medicine use statistics will be prepared and an academic study will be conducted on issues such as treatment compliance. (for example: users survey)

- Providing an effective medication follow-up for polypharmacy patients
- Increasing the compliance of chronic patients with medicine treatment
- Decrease in deaths due to chronic diseases
- Decrease in deaths due to medication errors
- Prevention of complications due to medication errors



10000 $ and Our Goals

If we gain support, what we will do with this support can be summarized as follows:



Work-Plan Chart

Works	Explanation	Time (as week)	Beginning	End	Week 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	Research Period	3	1	4	■	■	■																					
2	Technology Research	2	2	4		■	■																					
3	Project Algorithm Extraction	8	4	12				■	■	■	■	■	■	■	■													
4	MedMemo Technical Drawings	5	9	14									■	■	■	■	■											
5	MedMemo 3D Modeling	13	8	21								■	■	■	■	■	■	■	■	■	■	■	■	■				
6	Mobile Application Development	10	13	23													■	■	■	■	■	■	■	■	■	■		
7	Testing the System with Patients	1	15	16															■									
8	Feasibility Studies	10	15	25															■	■	■	■	■	■	■	■	■	■

References:

[1] https://www.aarp.org/content/dam/aarp/livable-communities/old-learn/health/ncoa-chronic-disease-self-management-fact-sheet-aarp.pdf

[2] R. Mayeux and Y. Stern, "Epidemiology of Alzheimer disease," *Cold Spring Harb. Perspect. Med.*, vol. 2, no. 8, 2012, doi: 10.1101/cshperspect.a006239.
Andrea B. Neiman, PhD1; Todd Ruppar, PhD2; Michael Ho, MD, PhD3,4; Larry Garber, MD5; Paul J. Weidle, PharmD6; Yuling Hong, MD, PhD1; Mary G. George, MD1; Phoebe G. Thorpe, MD7

[3]: Brown, M. T., & Bussell, J. K. (2011). Medication adherence: WHO cares?. *Mayo Clinic proceedings*, *86*(4), 304–314. https://doi.org/10.4065/mcp.2010.0575

[4]: Andrea B. Neiman, PhD1; Todd Ruppar, PhD2; Michael Ho, MD, PhD3,4; Larry Garber, MD5; Paul J. Weidle, PharmD6; Yuling Hong, MD, PhD1; Mary G. George, MD1; Phoebe G. Thorpe, MD7 (View author affiliations)

[5]: https://www.cms.gov/Research-Statistics-Data-and-Systems/Statistics-Trends-and-Reports/Chronic-Conditions/Downloads/2012Chartbook.pdf

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[8]: Vincent C. Tam, Sandra R. Knowles, Patricia L. Cornish, Nowell Fine, Romina Marchesano and Edward E. Etchells

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