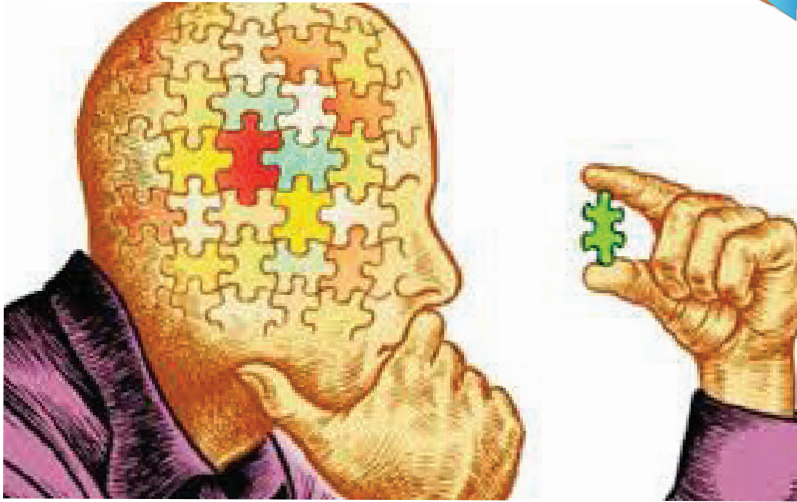# Brain Computer Music Interfacing
Software Developement
for Well-being (SM?)

1 intro
- poster;

2 progress
- compare timelines;

3 plan
- *think out of the box*

Brain Computer Music Interfacing Software Developement for Well-being (SM?)

K. Hofstadter - Timelines for PhD research 1. (09/2015)

Tasks	Academic Year I.	Academic Year II.	Academic Year III.
Reviewing the current state of literature // MT, NF, music psychology, compositional techniques;	▮▮▮▮▮▮		
Trial period/training programs with (music) students	▮▮ ▮▮ ▮▮	▮▮	
Further development of the software // implementing new compositional techniques; // customising code for multi-channel EEG; // mobile devices (iOS with Xcode) later;	▮▮ ▮▮	▮▮ ▮▮ ▮▮	▮▮
Demonstration, concerts/installations	▮	▮ ▮	▮
Publishing journal paper on the state of the research	▮	▮	
Conference presentations	▮	▮	
Trial period with students experiencing stress		▮▮ ▮	▮▮
Writing the thesis			▮▮▮▮▮▮

Brain Computer Music Interfacing Software Developement for Well-being (SM?)

Still thinking and reading

Have done some.
More in Colchester and ARU.
Neurosky AppStore > online survey.

K. Hofstadter - Timelines for PhD research 2. (05/2016)

| Tasks	Academic Year I.	Academic Year II.	Academic Year III.
Reviewing the current state of literature // MT, NF, music psychology, compositional techniques;			
Trial period/training programs			
Further development of the software // implementing new compositional techniques; // customising code for multi-channel EEG; // mobile devices (iOS with Xcode) later;			
Demonstration, concerts/installations			
Publishing journal paper on the state of the research			
Conference presentations			
Trial period with students experiencing stress			
Writing the thesis			

Too many ideas, needs refinement, help needed.

First SC standalone on Neursosky, then JUCE with XCode (parallel to SC developement)

Sonic Art CMT demo,
Pint of Science Festival, Cambridge
Musedelica Conference, Essex University, Brighton
10th Annuald research conference, ARU, Chelmsford

Brain Computer Music Interfacing
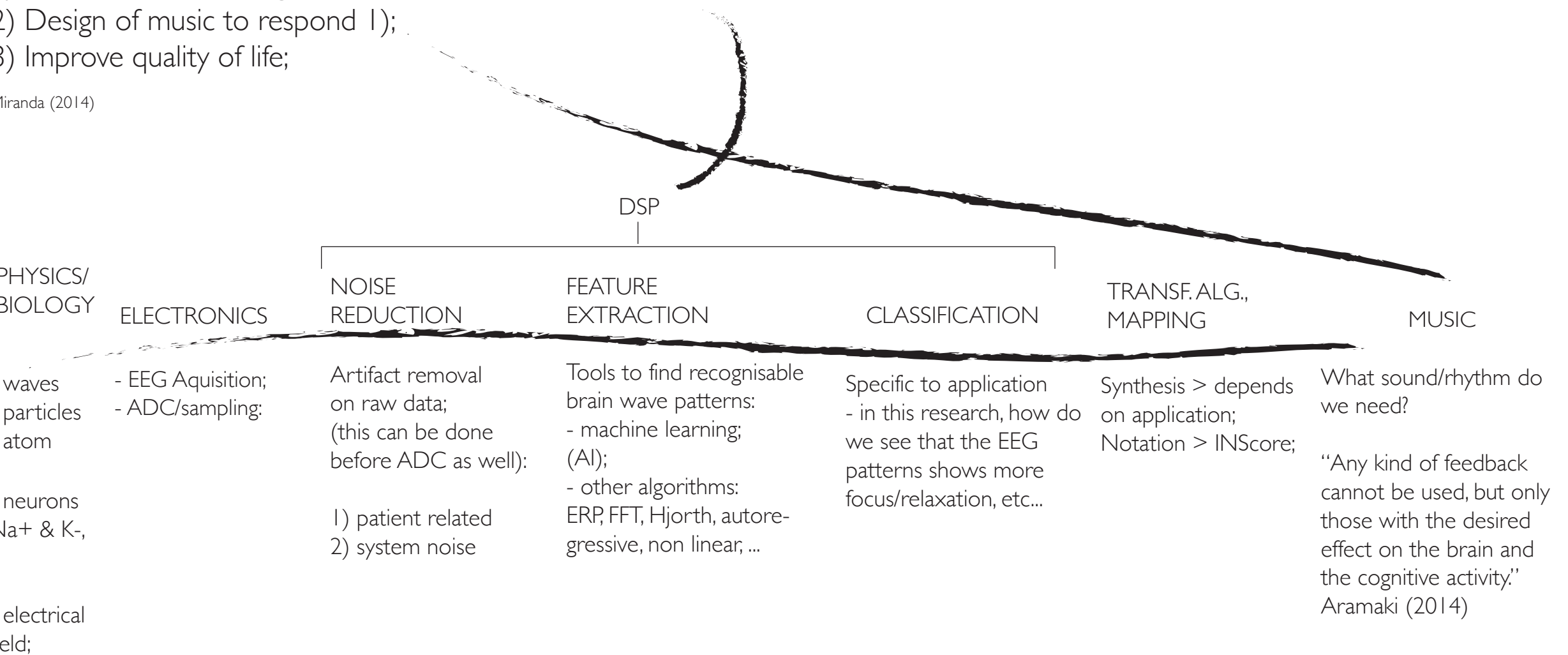# Software Developement
for Well-being (SM?)
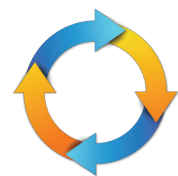
From presentation 01/2016:

Main challenges and outcomes of BCMI research:
1) Extraction of meaningful control information from EEG;
2) Design of music to respond 1);
3) Improve quality of life;

Miranda (2014)

DSP

PHYSICS/
BIOLOGY

ELECTRONICS

NOISE
REDUCTION

FEATURE
EXTRACTION

CLASSIFICATION

TRANSF. ALG.,
MAPPING

MUSIC

- waves
- particles
- atom

- neurons
Na+ & K-,

- electrical
field;

- EEG Aquisition;
- ADC/sampling:

Artifact removal
on raw data;
(this can be done
before ADC as well):

1) patient related
2) system noise

Tools to find recognisable
brain wave patterns:
- machine learning;
(AI);
- other algorithms:
ERP, FFT, Hjorth, autore-
gressive, non linear, ...

Specific to application
- in this research, how do
we see that the EEG
patterns shows more
focus/relaxation, etc...
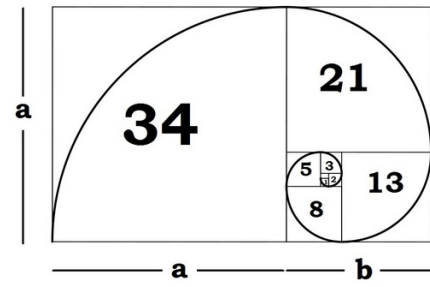
Synthesis > depends
on application;
Notation > INScore;

What sound/rhythm do
we need?

''Any kind of feedback
cannot be used, but only
those with the desired
effect on the brain and
the cognitive activity.''
Aramaki (2014)

Brain Computer Music Interfacing
Software Developement
for Well-being (SM?)

Self transcendence
Self actualisation (Maslow)

? *-how do we get there?*
-how could BCMI help?

Main challenges and outcomes of BCMI research:
1) Extraction of meaningful control information from EEG;
2) Design of music to respond 1);
3) Improve quality of life;

Miranda (2014)

Flow (Csíkszentmihályi)
'components of flow'
- thinking out of the box (problem solving)
- altered state of mind: - new perspective;

A.Watts - Cause of stress

Resonance

? *-how do we get/stay there?*
-how do we get/stay there with BCMI?

User makes preset musical expresions/algorithms.

MetaPHYSICS/
BIOLOGY/
Deeper Structures
of Life

MUSIC

What sound/rhythm do
we need?

34   **21**

5 **3**
2
8   **13**

a   b

Tonal music

Atonal music

[subjective]

Noise

''Any kind of feedback
cannot be used, but only
those with the desired
effect on the brain and
the cognitive activity.''
Aramaki (2014)

Brian Chan

SC140